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Rubber

As It Is Revealed by X-Rays

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THE beginning of the year of 1929 seems to be a logical time for considering critically the status of knowledge concerning the fundamental structure of rubber. Of all the contributions by various methods to the problem, those which have come as a result of the application of X-ray diffraction methods may be considered the most unique and perhaps most important in the past few years. It was known previous to 1925 that when rubber is strongly stretched it becomes warm, its specific gravity increases and it becomes doubly refracting. The name of J. R. Katz has become renowned throughout the world as a result of the experiment which he performed of causing a fine beam of X-rays to pass through a specimen of stretched rubber behind which was placed a photographic film. This experiment was one of those fortunate accidents which appear frequently in the history of science, but on the other hand, it was the result of clear thinking, rational deduction, and a keen appreciation of the possibilities of application of X-rays to the examination of the ultimate structure of materials.

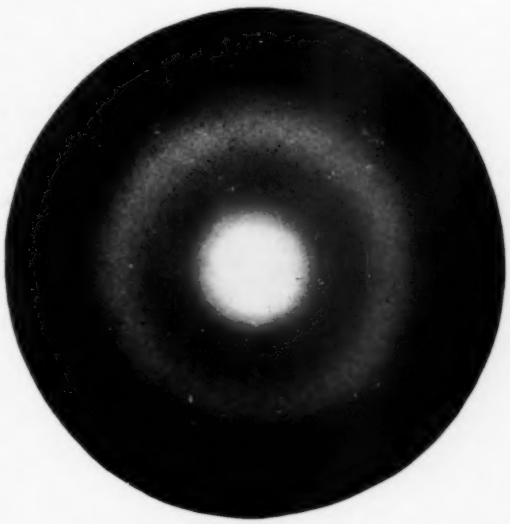


Fig. 1. Diffraction Pattern for Unstretched Rubber

The experiment had been frequently tried of attempting to deduce some information from the diffraction pattern of a single broad ill-defined halo obtained with unstretched rubber, but when this pattern was placed alongside one of rock salt or iron or calcite it was dismissed summarily as non-crystalline or "amorphous." After the discovery in 1913 by Von Laue and the Braggs, that crystalline materials serve as diffraction gratings for X-rays in the same way that finely ruled lines on glass will diffract visible light, a great number of materials were subjected to the method. Of course, single crystals or even fine powders of distinctly crystalline materials gave very definite patterns which were interpreted in terms of the ultimate architectural building scheme of these materials. Thus substances may be characterized by a unit crystalline cell or primitive parallelopipedon of certain size in which the atoms or molecules are arranged in definite pattern; this imaginary unit subdivision of space with dimensions of a few hundred millionths of a centimeter and containing an integral number of atoms or molecules as usually designated in chemistry, has the properties of a visible crystal and actually produces this by indefinite multiplication of itself in all directions.

There is formed as a result, sets of parallel planes upon which the atoms and molecules lie, and which serve as a three-dimensional diffraction grating for X-rays simply because the interplanar distances are of the same order of magnitude as the wave lengths of X-rays. The logical consequences of fifteen years of X-ray fine structure studies have been an amazing growth of knowledge of the solid state of matter as might be expected from a powerful investigational tool which enables man to extend the powers of his vision, indirectly, far beyond the capacity of any supermicroscope. The method permits the deduction of the sizes and shapes of atoms and molecules and a knowledge of the orderly forces in crystalline materials. Because this information is genuinely fundamental the prevalent research effort is now to crystallize everything (instead of dissolving or melting solids). The chemist has now actually verified

the existence and measured the lengths of long carbon chains, and benzene rings and other compounds as well as six hundred or more inorganic compounds of every conceivable kind and complexity.

It is small wonder then, that great interest was aroused in 1925 by Katz' discovery that stretched raw rubber produces an X-ray diffraction pattern which seems to indicate crystallinity as clearly as does the pattern of an aluminum wire. For the ill-defined halo for the unstretched rubber, classed as the pattern of an amorphous substance, (Fig. 1) has given way to a pattern with definite interference points lying on various concentric circles and also on a series of hyperbolas (Fig. 2). With such a pattern it is possible by the straightforward methods of measurement and calculation to determine the ultimate structure of stretched rubber just as easily as that of crystalline aluminum drawn into a wire. In order to understand the real meaning of these results it is desirable to tabulate the essential experimental facts derived in the X-ray studies of rubber by Katz, Hauser and Mark, Feuchter, Meyer and Mark, the writer and others.

1. Kinds of Rubber. Natural rubber in practically every state, coagulated latex, crepe, smoked sheets, vulcanized sheets, etc., produce the fiber crystal diffraction pattern upon stretching. No synthetic rubber specimens thus far prepared have given more than the faintest evidence of the phenomenon so that the fundamental process involved is a definite criterion of characteristic structure of natural rubber.

2. Elongation Required for First Appearance of Pattern. Raw rubber—above 75 per cent elongation. Vulcanized rubber—above 250 per cent.

3. Effect of Elongation on Intensity. Intensity of diffraction spots linearly increases with increasing elongation above critical value, while intensity of broad "amorphous" ring simultaneously decreases.

4. Positions of Interferences. Constant with increasing elongation.

5. Breadths of Interferences. Constant with increasing elongation, at least to 800 per cent; different in vulcanized samples as noted below; size of colloidal micelle may be calculated from breadths.

6. Effect of Method of Stretching. When stretched isothermally (very slowly) the interferences if appearing at all are very faint; when stretched adiabatically (very rapidly) maximum intensity of interferences at same elongation.

7. Time Required for Appearance of Pattern. Instantaneous upon stretching.

8. Effect of Temperature. Pattern disappears about 60° C.

9. Effect of Release of Tension. Process reversible and pattern disappears, though sometimes persisting for some time after release, particularly if specimen is cooled after stretching.

10. Effect of Solvent. Stretched specimens placed in solvent vapors no longer produce crystal pattern.

11. Racked Rubber. As a result of X-ray studies Feuchter has found it possible to extend rubber 10,000 per cent by successively stretching rapidly then heating until specimen contracts several times. The resultant thread gives a sharp X-ray pattern as detailed as with a pure organic compound; the racked rubber is insoluble and largely non-swelling in usual organic solvents (analogous to cellulose or silk fiber).

12. Effect of Purity. Purest extracted rubber, free from protein and resins gives a crystal pattern, providing that the phenomenon is associated with pure hydrocarbon C_5H_8 (polymerized).

13. Effect of Botanical Source of Latex. Appearance and positions of crystal interferences independent of botanical source. Balata and gutta percha are different from rubber and probably from each other.

14. Does Unstretched Rubber Ever Produce a Crystal Pattern? "Frozen" rubber (i. e. rubber which has stood for some time at low temperatures and has become opaque and hard) gives a pattern of sharp concentric rings indicative of small crystal grains in random orientation. These rings are spaced so that the interferences of stretched rubber fall exactly on them. Frozen rubber may be distinguished from oxidized rubber by the fact that upon warming or several stretchings it becomes normal and the crystal pattern disappears leaving only the broad "amorphous" rings.

15. Effect of Fillers. The typical rubber patterns appear and in addition those characteristic of the crystalline filler (zinc oxide, carbon black, pigments, etc.). Upon stretching the most of the filler particles remain in random arrangement. (Exceptions, magnesium carbonate and sulphur as noted below.)

16. Effect of Calendering. Introduces a fibrous structure (lining up of units) which is indicated by the X-ray pattern even without stretching.

17. Effect of Mastication. Tends to destroy crystalline orientation even when the specimen is strongly stretched.

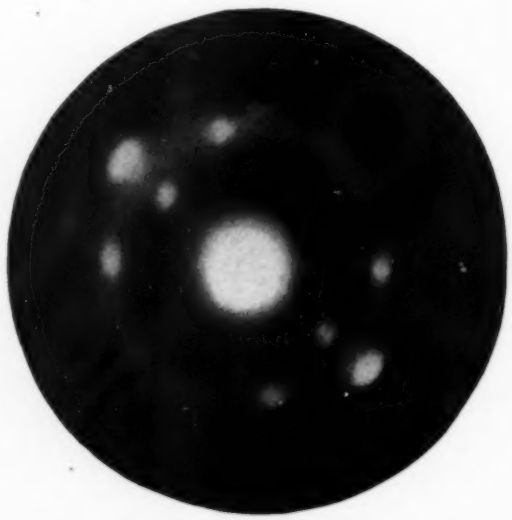


Fig. 2.—Diffraction Pattern for Raw Rubber Stretched 500%

18. Synthetic Rubber. All synthetic polymerized rubber-like substances such as polymerized isoprene, metastyrol, butadiene, polyvinyl acetate, etc., produce an "amorphous" pattern similar to that of rubber which is retained unchanged up to the highest elongations. Katz[1], however, maintains that with a pure methyl rubber two crystal interferences (only) appeared in addition to the amorphous rings. Hock and Barth[2] with a precision camera have demonstrated also a distinct change during stretching of synthetic rubber at low temperatures in agreement with earlier predictions from the Joule effect. Metastyrol when stretched produces a pattern in which the amorphous ring splits into two segments in the direction perpendicular to the direction of stretching, very similar to the action of gelatine upon stretching, so that arrangement is taking place in one or two, but not in three dimensions.

19. Dimensions Calculated from "Amorphous" Pattern of Unstretched Rubber. Two broad rings are produced corresponding to the spacings 14.88 (inner ring) and 6.05 A. U. Experiments by the writer[3] with very pure extracted rubber hydrocarbon very carefully freed from solvent give

[1] *Chem. Zeitung* 51, 53 (1927).
[2] *Z. Physik. Chem.* 134, 271 (1928).
[3] *Nature* 120, 119 (1927).

the values 11.15 and 5.97 A. U. In the presence of solvent vapor (swelling the rubber) the former value may increase up to 14.76 A. U. as a maximum. The inner ring is characteristic of polymerized substances, the outer one being found for corresponding pure unpolymerized liquids such as isoprene.

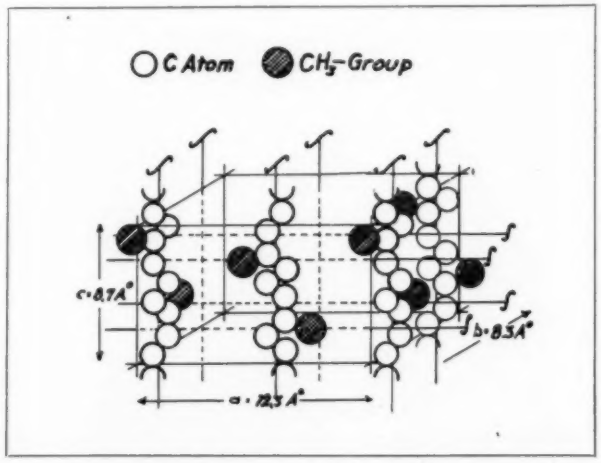


Fig. 3.—Elementary Unit of Rubber

20. The Unit of Structure in Stretched Rubber. From the crystal fiber diffraction pattern obtained with stretched rubber it is possible to deduce crystallographic system, the size of the unit cell, and from this and the density the number of molecules of C_5H_8 associated with the ultimate architectural unit.

Inasmuch as the pattern for stretched rubber is a characteristic of a fiber, i. e. a large number of small crystal grains definitely alined, it is possible to derive the identity period along the axis of fibering or the direction of stretching by direct measurement and without any recourse to knowledge of the crystallographic space group. This is done by drawing hyperbolas through the diffraction spots (Fig. 2) and measuring the distance of the vertex of each hyperbola from the zero equatorial line passing through the center of the diagram. When the X-ray beam is perpendicular to the fiber axis, a is the specimen to plate distance, and e the distance on the photographic plate from the trace of the center to the vertex of the hyperbola, the relation $e=a \tan\mu$ can be used to obtain the angle of the diffracted beam from the primary beam. The identity period or spacing which repeats itself along the axis is derived from $I=n\lambda/\sin\mu$ where n is a whole number and λ the wave length of X-rays used. The other two dimensions of the unit cell are somewhat less readily determined from the position of the spots on the concentric rings which may be drawn through them. The following results have been obtained in these evaluations:

Authority	System	Dimensions a	b	c (fiber axis)	No. C_5H_8 Groups per unit volume
Pummerer+Koch[4] (crystals)	Monoclinic	4.83 $\beta=77°19'$	4.71	5.33	1
Ott[5]	Cubic?	6.37			6 (atomic radii) 2 (density)
Katz[6]	Orthorhombic	6.5	6.5	8.0	3
Hauser+Mark[7]	Orthorhombic	8.0	8.6	7.68	4 (possibly 8)
Meyer+Mark[8]	Rhombic	12.3	8.3	8.1	8

[4] *Ann.* 438, 294 (1924).
[5] *Naturwissenschaften* 14, 320 (1926).
[6] *Chem. Zeit.* 49, 353 (1925).
[7] *Kolloid chem. Beihefte* 22, 63 (1926).
[8] *Berichte* 61, 1939 (1928).

In more than 75 precision measurements the writer has obtained as the average value of c, 8.003 A. U. confirming the value of Meyer and Mark 8.1 ± 0.1. The two other dimensions are also confirmed so it may be concluded that all other values are incorrect. Thus 8 isoprene groups—

$$CH_2—\underset{\displaystyle CH_3}{\underset{|}{C}}=CH—CH_2—$$

—are grouped together as the unit of structure of stretched rubber. The value 8 (N) is derived from the expression

$$N = \frac{\rho \times 1.008 \times V}{Mm}$$

where ρ is the density (about 1.0 for the crystalline portion of stretched rubber), V is the volume of the unit cell, M is the molecular weight of the simple kinetic molecule C_5H_8, and m is the absolute mass of the hydrogen atom.

21. The Sizes of Colloidal Micelles of Rubber. From the measurement of half-breadths of the X-ray diffraction spots, the size of the particles composed of the foregoing unit cells may be ascertained. Hauser and Mark first estimated the colloidal particle, which is that which ordinarily manifests itself, to contain about 4,000 C_5H_8 groups. However, since their unit cell dimensions were erroneous and since far more accurate methods of calculation of sizes in various directions are now available,[9] the following values represent more nearly the truth; length along fiber axis 300-600 A. U.; thickness 100-200 A. U. Hence the micelle contains 10,000-20,000 unit cells or 80,000-150,000 isoprene groups. The micelle appears to have the form of a long flat bundle.

22. Significance of the Very Small Unit of Structure of Rubber. The X-ray method has been subjected to bitter criticism by rubber, cellulose and protein chemists because the very small unit structural cell containing only 4 or 8 simple chemical molecules seems so incompatible with these substances of high molecular weight known to be polymers of simple parent molecules, even though the X-ray pattern in addition to the unit cell *gives a measure of this colloidal micelle.* The magnificent X-ray work of Hengstenberg in Staudinger's laboratory on the polyoxymethylenes, or polymerized compounds of formaldehyde,[10] gives the key to a seeming enigma.[11] Much of the difficulty lies in a confusion in terms, principally in the meaning of the word "molecule." Formaldehyde may form "endless" chains held together by primary valence forces just as is true in the simple molecule. Up to a length of about 45 formaldehyde groups, the X-rays will measure the *macromolecular* length. There is now incontrovertible evidence that isoprene groups form these "endless" chains in rubber, glucose residues in cellulose, and peptides in silk and other proteins. Hence unit cells do not contain the whole chains but only a submultiple. The space group for stretched rubber is V^4, which means 3 two-fold screw axes. No complete rings or chains of 8 or 4 or 2 isoprene groups can possibly account for the experimental X-ray diffraction results. The structure proposed by Meyer and Mark which is undoubtedly correct, is shown in Figure 3. The primary valence chains lie parallel to the fiber axis and extend *beyond* the *unit cell throughout the whole colloidal crystalline particle.* In the cell itself 2 isoprene groups one above the other, account completely for the observed spacing, with one group turned at 180° to the other. The methyl groups are in *cis* position and the whole arrangement accounts for the screw axes which run through the crystal. The disposition is shown schematically in cross section Figure 4. Each rectangular section

[9] Laue, *Z. Kryst,* 64, 115 (1926); later papers by Patterson and by Brill.
[10] *Zeit. physikal chem.* 126, 425 (1927).
[11] See the writer's paper "X-Ray Contributions to the Problem of Polymerization." *Ind. Eng. Chem.*, Feb., 1929.

represents 2 superposed C_5H_8 groups; 2 belong wholly to the cell and the other 4 are shared by neighboring cell, giving a total of 8 isoprene groups per unit cell. How long are the long chains of C_5H_8 groups held together by primary valences? This length must be the same at least as the measured size of the whole colloidal crystalline particle, 300-600 A. U., which means a chain of 75-150 isoprene groups as the *"structure-molecule of rubber."* These single long chains are not demonstrated in other properties such as osmotic pressure, but aggregates of them.

23. The Structure of Rubber. It is not the purpose here to consider critically all the theories of the structure of rubber which have been submitted to account chiefly for the property of elasticity, since this has been done recently.[12] The foregoing series of new experimental results leads to a comparatively simple structural picture based upon the long chains of isoprene groups lying side by side in parallel orientation along the direction of stretching. These are disoriented, though not necessarily completely resolved into the single chains, when the tension is released and the rubber no longer yields a crystal pattern. In the micelle these chains, possibly coiled in a spiral, are less compactly arranged as shown by a smaller density. The reversible labile condition and elasticity must be connected with the double bond. To saturate by hydrogenation or halogenation is to destroy the elastic properties. For a long chain in which appears a regular succession of double bonds would have a pronounced tendency to bend and to coil up as is amply demonstrated in calculations of molecular sizes from surface energy data for such acids as oleic as compared with saturated acids. Upon stretching these coils are straightened out into parallel orientation—thus is elasticity accounted for.

The other most recent theory, of Bary and Hauser, really reduces to the one just developed in the limit. The experiments of Freundlich and Hauser with the micromanipulator on latex particles, and fractionation experiments of Pummerer, Feuchter and others have produced convincing evidence of the presence of two hydrocarbons in rubber, a higher and insoluble polymer (β), and a lower soluble polymer α of the same basic molecule, namely C_5H_8. If an insoluble β form is responsible for the crystal interferences, then α is dissolved in it to form a one-phase system. The ratio $n_1\alpha/n_2\beta$, where n_1 and n_2 are the numbers of the corresponding macromolecules,[13] may be changed by temperature or mechanical treatment; n_1/n_2 is small at ordinary or low temperatures but increases with temperature or working. Upon "freezing" rubber β increases at the expense of α. Upon stretching α is squeezed out of β and these macromolecules in a sense crystallize or solidify and produce crystalline interferences. There is a clear similarity between rubber and liquid crystals. By the classical work of Friedel these are shown to be an intermediate mesomorphic state between amorphous and crystalline, namely nematic, in which molecules are aligned in the same direction but not in equidistant layers, hence produce no X-ray diffraction effects. Lehmann and Vorländer's work on liquid crystals has demonstrated that these are formed only by long molecules in linear arrangement. However the tendency to form liquid crystals does not increase indefinitely with molecular length but reaches an optimum value. Thus while liquid crystals and racked rubber are in many respects analogous, they differ in that one diffracts X-ray like an amorphous liquid and the other as a sharply crystalline substance.

We are led once more to the conception of a preformed very long molecule formed by high polymerization of a simple hydrocarbon C_5H_8 in which the links, bound by primary valence forces, lie on screw axes,—and a small unit cell results. It is immaterial whether, in release from tension and return to the amorphous condition of rubber, these long molecules become coiled again, and out of parallel arrangement, or whether the two-phase system of β and α hydrocarbons again becomes a one-phase system with β swollen by α until the swinging amplitudes of the lattice points are too large for visible interference.[14]

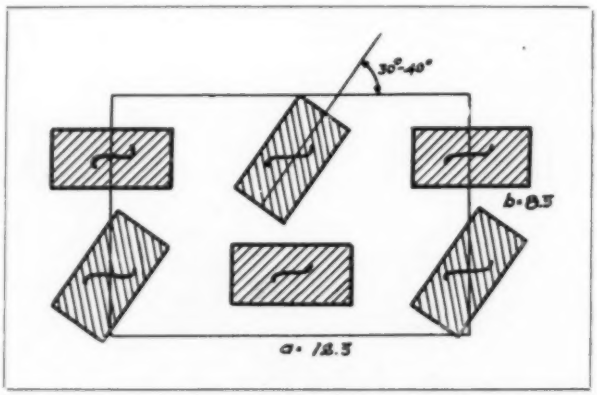


Fig. 4.—Elementary Unit of Rubber, Cross Section, Schematic, Through the Main Valence Chain and the Fiber Axis.

One of the most eloquent analogies to this proposed structure of rubber is to be found in the recent X-ray studies of the system nitrocellulose-camphor (celluloid) by Ueda.[15] As crystalline camphor is added and goes into solid solution in a nitrocellulose fiber, which alone gives a beautiful fiber diffraction pattern, this disappears and an amorphous ring is formed. Upon extraction of the camphor the nitrocellulose diagram is regained. If a celluloid film is stretched the camphor crystallizes out of solid solution and a nitrocellulose fiber diagram is formed. Substitute β and α rubber, respectively, for nitrocellulose and camphor and the phenomena are practically identical.

However the picture of spring-like long chains of isoprene groups which may be drawn into parallel orientation during stretching so that X-ray diffraction results as truly as from genuine crystals, is one of far greater simplicity and it explains adequately all the experimental facts enumerated in this paper. Evidences of more than one polymer are to be ascribed simply to micelles of different sizes, that is, long primary valence chains of different lengths or different numbers of chains bundled together in a micelle. The great stumbling block as to the significance of the very small unit of crystalline structure is entirely removed when it is understood that there are sub-periodicities along the chains, which are themselves as long as the colloidal particle itself, and that these small distances represent a turn in a screw axis. The great power of the X-ray method is proved by the fact that the same diffraction photograph gives both the chain length, or micellar size, and the comparatively tiny screw axis periodicity.

Here, furthermore, is provided a clear insight into the universal manner in which nature builds such materials as rubber, cellulose, silk, muscle fibers, chitin, etc. Stretched rubber is comprised of bundles of long chains the links of which are isoprene C_5H_8 groups; cellulose is analogous with dehydrated glucose residues $C_6H_{10}O_5$ as links; and the same is true of silk with polypeptide chains and of chitin with acetyl-glucosamine groups in chains. Thus do we have a universal architectural plan for vastly different building materials. While there are still many difficult and unsolved

[12] Hauser, *Latex*, 1927. Bary and Hauser, *Kautschuk* 1928, 96.
[13] This word is used to distinguish these large units or chains from the simple C_5H_8 molecule.
[14] The general picture of the nematic state and of long chain molecules for rubber has been accepted by Katz, *Ergeb. exacten Naturwissenschaften* 4, 154 (1925); *Naturwissenschaften* 14, No. 38; and Feuchter, *Kautschuk*, 1928, 103.
[15] *Z. physik Chem.* 133, 350 (1928).

details the X-ray method has simplified and rationalized one of the most difficult fields in chemistry and technology.

24. Some New Facts About Vulcanization. Meyer and Mark have shown the remarkable similarity between the reaction of sulphur chloride with ethylene (to form mustard gas) thus: $\begin{matrix}CH_2{:}CH_2\\CH_2{:}CH_2\end{matrix} + SCl_2 = \begin{matrix}Cl.CH_2{:}CH_2\\Cl.CH_2{:}CH_2\end{matrix})S$

and with rubber, containing a hydrocarbon also of olefine character and forming $(C_5H_8)_2SCl_2$. Thus in cold vulcanization bridges might be formed between double bonds in the same micelle and also between neighboring micelles (a micelle being a bundle of the long chains of isoprene groups as explained above). This results in the tying of micelles together at single points and ultimately in the formation of hard rubber without elasticity. One consequence at once is

Fig. 5.—Diffraction Pattern for Vulcanized Rubber Stretched 500% (Note sharpness of spots as compared with Fig. 2).

the tendency to form larger micellar units than those existent in raw rubber. This prediction is fully verified in new work by the writer. Careful measurements of diffraction interferences for stretched samples prove that the breadths are materially smaller than those for raw rubber (compare Figure 5 for vulcanized with Figure 2 for raw rubber) and hence that the colloidal particles are materially larger.

Furthermore numerous measurements on the positions of the hyperbolas of the fiber diagrams for stretched samples, in which the vertices have been accurately plotted from the equation of an hyperbola, indicate a small but distinct difference in the dimensions of the unit cell in the direction of stretching. The value for raw rubber is 8.003 A.U. while for the special vulcanized samples the value varies from 8.15 A.U. with very small amounts of sulphur down to 7.93 A.U. for large amounts. The contraction compares with that observed upon mercerization of cellulose. Patterns have been obtained in which excess small sulphur crystals very definitely fiber or orient themselves when the specimen is stretched. For the continuous diffraction rings for sulphur powder in random arrangement in the unstretched rubber change into symmetrical discontinuous arcs. This phenomenon has been observed heretofore only with magnesium carbonate filler. These new and unexpected results will be the subject of a later detailed paper.

IN A RECENT SAFETY SLOGAN CONTEST HELD BY THE Firestone Tire & Rubber Co., Akron, O., more than two thousand employes submitted short snappy safety messages.

Rubber Division, A. C. S.

Boston Group Meeting

A JOINT meeting of the Northeastern Section, A. C. S. and the Rubber Division, A. C. S. Boston Group was held at the University Club, Boston, Mass., on the afternoon and evening of January 12, 1929.

After a brief introduction by Dr. A. W. Rowe, chairman of the Northeastern Section, A. C. S. the afternoon session was opened at 3 P. M. by John M. Bierer, chairman of the Boston Rubber Group, who introduced the first speaker, Dr. A. A. Somerville. "Some New Laboratory Work on Rubber Compounding" was the title of the paper in which the use of Selenium in compounds was described and illustrated by the lantern.

In the discussion which followed, some very interesting points were brought out regarding the use of Selenium.

The second paper of the afternoon session was read by T. M. Knowland on "Tire Design with Relation to Comfort, Flexibility and Wear." The principal items touched upon were the broad defects of carcass failure and tread wear.

Following the dinner hour Dr. James F. Norris, past-president A. C. S. gave a brief and interesting account of his recent visit to Russia.

Next a paper was read by W. B. Wiegand entitled, "Deduction of Rubber Stress Strain Determinations." This was a mathematical dissertation illustrated by diagrams projected as lantern slides.

Dr. E. R. Bridgwater's paper on "Anti-Softeners and Fatigue Inhibition" followed. Its discussion was combined with that of Dr. Sidney M. Cadwell's paper on "Anti-Oxidants" which immediately succeeded it. Many points of practical value and interest to the trade were developed in the course of the discussion.

In the matter of attendance, interest and practical bearing of the papers read, this symposium ranks high among Rubber Group meetings. The date of the next meeting will be announced later.

Italians Seek American Tires

Despite the inadequate stocks of American tires carried by dealers in Italy, a condition repressing sales and favoring Italian manufacturers who keep distributors amply supplied with standard sizes, sales of American tires in Italy continue to mount. Following a steady increase for three years past, imports of American tires rose suddenly in the first six months of 1928 to 332,700 kilos, as compared with 60,200 in the first half of 1926 and 92,700 in the first half of 1927. France continues to hold first place in imports, but the United States has displaced Great Britain for second place. During the first half of 1928 France supplied 550,500 kilos and England 234,100. According to United States Commerce Reports, sales in 1928 of Italian-made tires were expected to be the lowest for many years. Were prices lowered and better merchandising methods pursued, it is claimed that sales of American tires could be much increased. There quality is freely conceded.

A. S. T. M. Meeting

The annual meeting of the American Society for Testing Materials will be held June 24-28, 1929, at the Chalfonte-Haddon Hall, Atlantic City, N. J. Plans similar to those in effect last year will be developed to facilitate registration and the making of reservations. Details of these plans are to be announced later.

Measuring Temperatures of Calender Rolls

L. R. Keltner

IT has only been within recent years that the importance of knowing the exact conditions under which rubber is processed has been appreciated. This is especially true of the calendering operation. For many years a calender man's experience was the only assurance one had of producing properly processed material. Demand for greater uniformity of product now necessitates more uniformly processed materials. The ultimate outcome of these demands was the setting up of a definite set of mixing and calendering specifications.

It is readily recognized that a calendering specification would not be complete without some reference to the calender roll temperature. The effect of heat on rubber processing cannot be discussed here but it should be stated that it is of tremendous importance. The need for a roll temperature measuring device thus presented itself and various types of instruments have been experimented with.

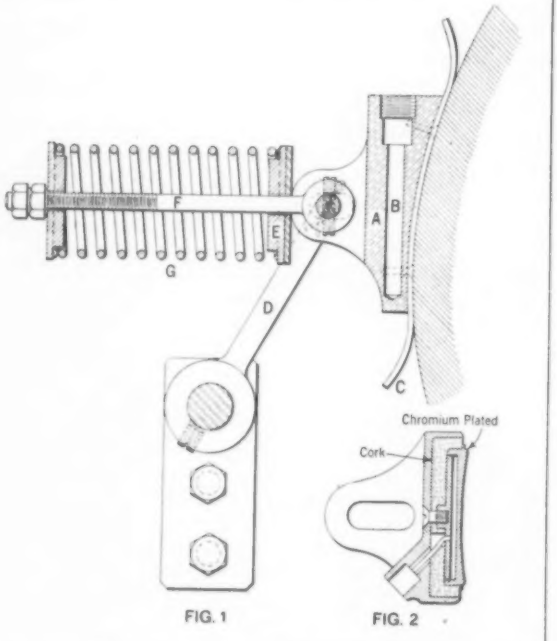


FIG. 1

FIG. 2

Early experiments were made in a crude manner by attaching the hot junction of a thermo-couple to a small 1-inch square brass plate which was mounted on a yard stick. This stick was used as a lever and a cross bar from the calender housing as a fulcrum. After the brass plate had been placed at the desired spot on the roll, pressure was applied by pulling up on the end of the stick opposite the junction. Data obtained was satisfactory but the apparatus had no practical application in production. Other experiments along the same line were carried out later.

In one of these arrangements the hot junction was attached to a shoe whose duraluminum face was concave to fit on the surface of the roll. The leads from the couples were attached to a pyrometer whose indicator was calibrated on a temperature scale and a reading was automatically recorded on a chart every minute. The system was electrically actuated throughout. This apparatus was fairly satisfactory in the laboratory although some trouble was encountered in holding a calibration and in keeping rubber from dislocating the shoe.

During this experimenting several factors presented themselves as necessary features of any instrument which was to be used in production. They are as follows: (1) It must be rugged and durable. (2) It must not be dislocated by rubber. (3) It must be fairly accurate. (4) It must be easily maintained.

These features seem best contained in the apparatus which we are using at the present time, as shown in Figure 1. It consists of a manganese bronze shoe *A* drilled to fit an expansion system thermometer bulb *B*, and faced with a zinc wearing strip *C*. The strip is concave, fitting the calender roll and has a reverse radius at both ends. These rounded ends prevent any stray rubber from catching on the shoe. The shoe is held in position by the arm *D*, which is bolted to the calender housing. On the back side of the shoe is welded a spring seat *E*, through the center of which protrudes a tension rod *F*. At the threaded end of this rod, two hex nuts and a washer may be adjusted to supply the tension on the spring *G*. The other end of the tension rod is joined at the shoe to the curved end supporting arm *D*. This allows the shoe about ¼-inch movement against the spring and thus releases it from the calender roll when any irregularity on the roll surface occurs. The bulb of this apparatus is attached through an armored tube system to a temperature recorder of the proper range.

The apparatus is rugged, seldom requiries attention and is not easily dislocated. Heat losses due to radiation and conduction are partially compensated by heat generation due to friction of shoe to roll. Variation in temperature is approximately 5°.

An improvement in this apparatus has recently been designed by one of the instrument companies and is shown in Figure 2. The changes in design of the apparatus as compared with Figure 1 are in the expansion system. In this diagram, we show a cavity built directly in the shoe. It is closer to the surface of the roll and is insulated by approximately ¼-inch of cork. This should give even better results.

Another instrument used in experimental work is the Cambridge hand pyrometer. This portable pyrometer consisting of a bi-metallic band so attached to galvanometer connections that it will assume the curvature of the roll when pressed against its surface has also proved of value in taking roll temperatures. The instrument in its present form is not properly compensated for variations in room temperatures and will give accurate readings, only if they are corrected according to the proper calibration curve for the specific room temperature at the time used.

NOTE—Publication permitted by *Ind. & Eng. Chem.* Paper read at the Akron Group Rubber Division A. C. S. meeting held in Akron, O., Dec. 3, 1928.

Rubber Trees in California

Rubber trees used to grow in profusion in California, according to Charles and H. Flagler Cowdon, geologists, now studying on the ground a remarkable forest of petrified trees which they discovered in Last Chance Canyon, Valley of the Giants, Mohave Desert, and 135 miles northeast of Los Angeles. Besides rubber, mahogany, palms, and other tropical trees grew there luxuriantly in the Miocene period, but have since turned to stone. Imbedded among them have also been found fossil remains of camels, 4-tusked elephants, rhinoceros, saber-toothed tigers, and other beasts that would have made rubber collecting a hazardous job for the men who lived in those parts and whose bones have been chiseled from the silicious deposits after lying untouched for perhaps 50,000 years.

Technical Application *of* Antioxidants

E. R. BRIDGWATER

The term antioxidant has become broadened so as to include not only materials that prevent the oxidation of rubber but also chemicals that improve flexing resistance and prevent cracking. It is suggested that antioxidants be tested in such a manner as to bring out their influence on the ability of the rubber compounds to withstand mechanical stresses.

IT is unfortunate that the process of vulcanization, to which the commercial use of rubber is almost wholly due, makes it much more susceptible to oxidation. The deterioration that sets in as soon as rubber is vulcanized was first attributed to oxidation by Miller in 1865 but it is only during the last 20 years that a serious effort has been made to find means of preventing it. During this period it has been found that many chemicals retard the oxidation of rubber when incorporated with it prior to vulcanization. Phenolic compounds, primary and secondary amines, aminophenols and condensation products of aldehydes with amines are the chemical groups within which the most valuable antioxidants are found. Many amines and aldehydeamine condensation products are also vulcanization accelerators and some of the earliest known accelerators have a mild antioxidant effect. Para-phenylenediamine and para-aminodimethylaniline were used as accelerators long before the term antioxidant was coined and their favorable effect on the aging properties of rubber compounds has been a matter of common knowledge for more than ten years. Recent investigations have disclosed numerous compounds in these classes that have little or no accelerating effect and are far more effective in retarding oxidation than any of the known accelerators.

Within recent years, rubber chemists have come to realize that oxidation is by no means the only way in which rubber deteriorates nor is it always the most serious form of deterioration. The term "antioxidant" has been broadened to include all materials that prevent the deterioration of rubber, either in storage or in service, regardless of whether the deterioration is due to oxidation or to other causes. It has been suggested that it might be preferable to use a more inclusive term, such as "anti-deteriorant" to describe these compounds but the word "antioxidant" has become firmly established and there seems to be just as much reason for retaining it as there is for retaining the word "accelerator" to describe compounds that do much more than merely accelerate the vulcanization of rubber.

Reversion

One of the most serious forms of deterioration to which rubber is subject is reversion or devulcanization. It was formerly the custom to speak of the vulcanization of rubber as an irreversible reaction because the sulphur that combines with rubber during vulcanization can be removed only with difficulty, if at all. However, most rubber chemists now agree that the essential difference between vulcanized and unvulcanized rubber lies not in the degree of saturation but rather in the degree of aggregation. The combination of sulphur with rubber appears to be only incidental to the more significant physical changes that occur on vulcanization and those physical changes are certainly reversible. The tendency toward reversion is always present in vulcanized rubber but may not be apparent if the rubber contains an accelerator of the non-fugitive type and sufficient sulphur to permit vulcanization to continue at a slow rate, thereby counteracting the tendency toward reversion. Accelerators that are destroyed during vulcanization are usually referred to as fugitive while accelerators that are not destroyed and cause vulcanization to continue as long as free sulphur is present, are termed "non-fugitive."

Blooming compounds have less tendency toward reversion than non-blooming compounds, other factors being equal, because the free sulphur causes vulcanization to continue at a sufficient rate to at least partially counteract the tendency toward reversion. It is therefore apparent that after-vulcanization is not necessarily harmful and an ideal rubber compound is one that continues to vulcanize at a rate just sufficient to counterbalance reversion. On the other hand, one must guard against the use of non-fugitive accelerators in high sulphur compounds because the rate of after-vulcanization may be so great as to more than counteract reversion and therefore cause the rubber to become stiffer, harder and shorter as aging proceeds.

Anti-Softeners

Some antioxidants have a stiffening effect on rubber even in the absence of free sulphur. Benzidine and meta-tolylenediamine are outstanding examples of this class of compounds to which the term "anti-softener" has been applied. Their effect is quite pronounced even when used in exceedingly small quantities and, because their efficacy does not depend upon the presence of free sulphur, they are of great value in preventing the reversion of low sulphur non-blooming compounds.

Reversion may, of course, be caused by overcuring low-sulphur compounds. The reversion that occurs on overcuring differs only in degree from that which occurs during aging. The time-honored way of preventing reversion on overcure is to use sufficient sulphur so that it will not be entirely ex-

NOTE: Presented before the N. E. Section and Rubber Division, Boston Group, A. C. S., Boston, Mass., Jan. 12, 1929.

hausted before the cure is completed. This is, however, a satisfactory solution of the difficulty only when a non-fugitive accelerator is used. The tendency toward reversion on overcure may be greatly reduced by using an anti-softener, in order that the rubber may tend to continue stiffening even after the sulphur is exhausted, thus counteracting the tendency toward softening or reversion.

Tension Cracking

There is another type of deterioration that is less well understood than oxidation and reversion but is often of even greater importance. Common examples of it are the cracking of boot uppers at the point where they are folded when placed in the shipping carton; the cracking of pneumatic tire treads at the base of the design or ribs; and the cracking of rubber soles due to the tension on the rubber around the stitches and across the ball of the foot when the sole is flexed, as in walking. This type of failure occurs wherever rubber is held under tension for a long period, as in the case of boot uppers that are folded, or when rubber is alternately stretched and released as in the case of pneumatic tire treads. It will be noted that cracking always occurs in tire treads at the point where the stretch is greatest due to the distortion of the tread design that is caused by the weight of the car and by the transmission of power through the rear tires. Highly compounded stocks ordinarily crack more readily than less heavily loaded compounds.

This form of deterioration appears to be quite unrelated to oxidation. It is, of course, true that rubber oxidizes more readily when it is stretched but it is clear that oxidation is not the only cause of "tension-cracking" because many materials that are good antioxidants are of little value in preventing tension cracking. The friction and skim coat stocks which bind together the plies of a pneumatic tire or a power transmission belt are also subjected to tension in service because of the tendency of the plies to move relative to one another when a tire is flexed or when a belt passes over its pulley. It is therefore not surprising that the same materials which retard the cracking of pneumatic tire treads or boot uppers are also effective in decreasing the tendency toward ply separation in pneumatic tires and in transmission belts.

It may or may not be a mere coincidence that the most effective compounds that are known for retarding these forms of deterioration are also powerful oxidation inhibitors. In any event, the term "antioxidant" is being used, even when the primary purpose for which the chemical is added is not to inhibit oxidation but to prevent the cracking of treads or to retard the tendency toward separation of friction and skim stocks. Among the most effective compounds for this purpose are phenyl-alpha-naphthylamine and phenyl-beta-naphthylamine. In some cases it has been found desirable to use a small percentage of an anti-softener such as meta-tolylenediamine in conjunction with phenyl-alpha or beta-naphthylamine. A few examples of the uses to which this class of compounds has been put will probably be of interest. It has been found that the life of airbrake diaphragms may be more than doubled using phenyl-alpha-naphthylamine combined with meta-tolylenediamine in the friction and skim-coat compound. The life of the diaphragm in this case is measured by alternately applying and releasing air pressure, as in service, until separation occurs. In another case, it was found that the time that a fan belt would run before the plies separate could be increased by approximately 60 per cent due to the addition of phenyl-alpha-naphthylamine and meta-tolylenediamine. In highly compounded black soles it appears that the tendency toward cracking can be greatly reduced by the use of these chemicals. Their major use is, of course, in pneumatic tires—in the tread for the prevention of cracking and in the carcass stocks because they decrease the tendency toward ply separation.

Sun Checking

Tension cracking must not be confused with sun checking. Reference has been made above only to the type of cracking that is caused by mechanical stresses alone. Sunlight and ozone cause rubber to crack or check, which cracking is accelerated by stretching the rubber but, so far as the writer is aware, no compounding ingredient is known which will prevent this type of failure with the exception of materials that bloom to the surface, forming a protective coating. Paraffin wax is the most widely used and probably the best material for mitigating the harmful effect of sunlight, although it falls far short of being a perfect remedy.

Testing Methods

The above examples are sufficient to illustrate the significance of the new and greatly broadened meaning of the term antioxidant and it is suggested that the manifold functions of antioxidants should be borne in mind by all those who are engaged in the testing of rubber. If the only purpose of an antioxidant were to prevent the combination of oxygen with rubber, it would seem that the proper way to test antioxidants would be to determine the rate of increase in weight when samples are exposed to air or, still better, to oxygen in the Bierer-Davis bomb. Many workers in this field have based their conclusions with respect to the efficacy of antioxidants solely upon the rate of change of tensile strength, elongation and stiffness of rubber samples during aging in the air at elevated temperatures or in the oxygen bomb. This practice is open to serious criticism because such tests give no information with respect to the efficacy of a product in preventing the cracking of tire treads or shoe soles or decreasing the tendency toward separation in carcass stocks.

It seems obvious that the properties which should be measured are those which actually come into play in service and that they should be measured both before and after aging in air or in the oxygen bomb. Tensile strength is a factor of little importance in the case of coated fabrics. It seems, therefore, that the best way to test them is to age them in the oxygen bomb and compare the flexibility and elasticity of the rubber coating before and after aging. It is suggested that antioxidants for shoe soles be tested by sewing the soles on to a leather belt which is run at high speed around small pulleys, the test being conducted on both aged and unaged samples in order to determine not only the effect of the antioxidant on the aging properties of the compound but its effect on the tendency toward cracking of fresh soles as well.

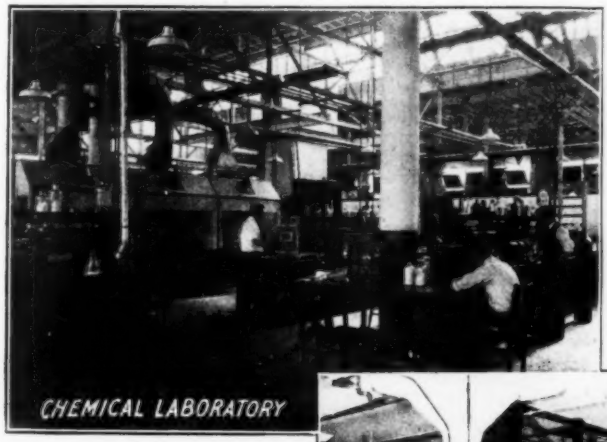
It seems not unlikely that the discovery of materials which retard separation in pneumatic tire carcasses, belts, etc. will make it possible to use larger percentages of reclaimed rubber than has heretofore been practicable in such compounds. Certainly, it is no longer necessary for tire manufacturers to limit the hardness of tread compounds for the purpose of preventing cracking and it may now be found that more heavily loaded tread compounds could be used to advantage. On the other hand, there are other factors than tread cracking which make it inadvisable to use a too stiff compound for a tire tread.

Sufficient work has not yet been done to show why the materials that we call antioxidants prevent the cracking of rubber and retard separation, but the discovery that they do opens up many new possibilities in mechanical goods and specialties as well as in tires, and certainly offers a most fertile field for further research.

ACCORDING TO PRELIMINARY OFFICIAL STATISTICS, ITALY exported 6,020,500 kilos weight of pneumatic casings and tubes (for motor cars, motor cycles, and cycles) during the first nine months of 1928, as compared to 6,169,600 kilos in the first nine months of 1927.

General Laboratories U.S. Rubber Co.

THE General Laboratories are part of the development department of the United States Rubber Co. organized to conduct all the research work of the entire company. They are equipped to carry out investigations relating to pure and applied research on all phases of the chemistry and physics of rubber, also its technology and industrial processing.



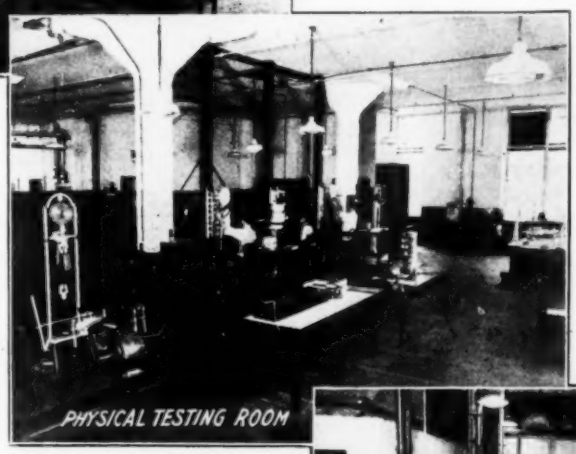
CHEMICAL LABORATORY

The organization is under the direction of Ernest Hopkinson, vice president, in charge of research and development. The activities of the laboratories are in charge of Dr. Willis A. Gibbons. There is a large technical staff of chemists and physicists, in addition to clerical, mechanical and other employes.

The laboratories having outgrown the building in New York in which they were originally installed were removed during the past year to Passaic, N. J. There they are housed adjacent to the plant of the New York Belting & Packing Co., one of the mechanical rubber goods manufacturing units of the United States Rubber Co. The building occupied by the laboratories is pictured in the illustration. It is of heavy fire proof construction erected a few years ago for silk manufacturing. Each floor of the structure is planned, sub-divided and equipped for the special sections in the scheme of work.

The office of the director is located on the fourth floor of the structure, where the chemical laboratories are located and reached by an automatic electric elevator. Here one finds an ideal arrangement of spacious offices, laboratories, library and conference rooms. A central hall or corridor gives access on either side to the various laboratories and other rooms planned for coordinated research in the details of the accessory functions of the non-technical departments.

High in the roof over the chemical laboratories is a central monitor extending the full length of the building. This supplies a flood of overhead light and air circulation for the entire floor area. Side illumination is obtained through the practically continuous window area of the walls interrupted only by the supporting brick piers. The partitions between rooms on this floor extend upward only a few feet; thus light and air from above is not obstructed. An excellent idea of these splendidly lighted and spacious laboratories is conveyed by the pictures here shown. These views of the analytical laboratories also show the liberal equipment in use for prosecuting the analytical work and chemical research. Such permanent fittings as hoods, benches and sinks are of stone. A ventilating system of piping connects all hoods to the outer air above the roof for ventilation of noxious fumes and vapor.



PHYSICAL TESTING ROOM

On the third floor the physical testing room is fitted with standard testing machines in great variety for making physical measurements and autographic record tests on cured rubber samples and textiles. Many special appliances devised for the study of the physical properties of rubber are in-

MILL ROOM

stalled for the study of all sorts, conditions, compositions and adaptations of rubber. These are frequently devised for special experimental study but from them have been developed some outstanding standard testing machines that have been made available to the rubber industry in general. Notable among these are the United States Rubber Co. machines for testing the abrasive resistance of rubber and that for testing the flexing endurance of rubber.

The second floor of the building is being prepared as a control laboratory for the New York Belting & Packing Co. This company, like all the manufacturing units of the United States Rubber Co. organization, operates a separate testing laboratory for factory control purposes and the systematic testing of manufactured products.

One of the illustrations gives a glimpse of the mill and calender room on the first floor. The machines there are all electrically driven. They are of the usual experimental size and types provided with ample safeguards against accidental injury to the operators. They afford means for the preparation of experimental mixings on a small or even semi-commercial scale when desired. There is, in addition, a line of factory size mills. Adjoining the mill and calender room are vulcanizing facilities for making controlled cures by any of the methods employed in actual manufacturing. The appliances include steam vulcanizers and platen presses operating under time and temperature control.

Other rooms in the basement are assigned for storage of materials, etc., and require no further reference.

Guayule Rubber Recovery

Improved Method of Separating Guayule from Its Natural Fiber Entanglement

BY a recent invention [1] a method is provided of separating rubber from the guayule shrub in which the rubber is enclosed within the plant cells. According to this invention, the fibrous structure and the cell walls of the guayule shrub is disintegrated and disrupted by subjecting the material to penetration with suitable gaseous agents which are raised to a sufficient pressure and then permitted to expand substantially instantaneously. The expansion, which is in the nature of an explosion, fractures the cell walls, releases the rubber content thereof and reduces the material to a condition which facilitates the recovery of the rubber either by solution in a suitable rubber solvent or by a limited amount of grinding of the material in water to effect agglomeration of the minute rubber particles.

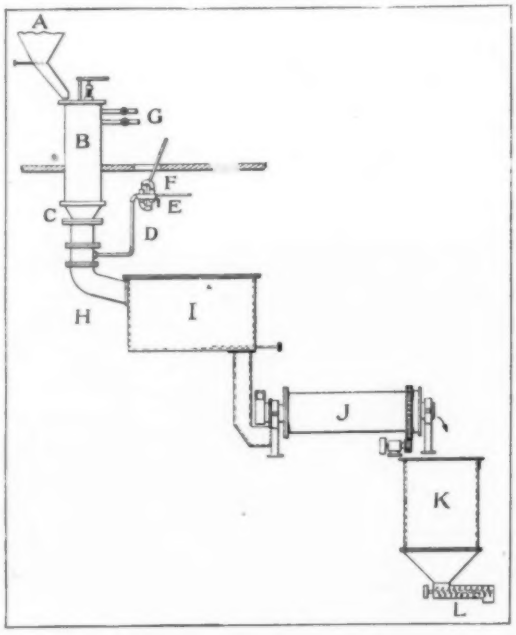
The gaseous agents employed for penetration and expansion of the material may vary. Steam may be used at pressures which do not involve excessive temperatures. Guayule rubber is not injured by exposure to temperatures up to 300° F. for limited periods of time. Other gases such as air, carbon dioxide can also be used. Such gases may be combined to avoid any undesirable effect which might result from the use of one of these gases alone. For example mixtures of air and carbon dioxide can be used also to avoid any undesirable oxidizing effect of air alone.

During the penetration stage the pressure may be relatively low, e. g., 10 to 100 pounds per square inch. This stage may continue for a relatively short time, for example, from 10 seconds to one minute and may be followed by a shorter period of from 3 to 5 seconds during which the pressure is increased to 800 pounds per square inch. The pressure is then suddenly released and the material is discharged from the pressure chamber by the force of the expansion.

[1] U. S. Patent No. 1,695,676.

The material is thereby thoroughly disintegrated, the cell walls are broken down and the rubber exposed. The material may be delivered in that condition to storage receptacles from which it may be withdrawn and treated either with a rubber solvent or by grinding to effect agglomeration of the rubber particles.

The accompanying diagram represents a sectional view of the extraction plant. The shrub previously roller crushed is discharged from the hopper *A* through an opening in the top head of expansion chamber *B*. The upper and lower heads of this chamber are secured to the cylinder and are



The Yeandle Guayule Recovery Process

normally closed. The lower head *C* of the chamber is conical with an orifice which can be closed by a plunger supported within an interior cylinder which is adapted to be supplied with water under pressure through pipe *D* and is exhausted through pipe *E*. By exhausting the cylinder through the two-way valve *F* the plunger closing the bottom section *C* can be released instantaneously to permit the ejection of the material from chamber *B*.

The piping *G* permits the introduction of gases and liquids to chamber *B*. The outlet pipe *H* is adapted to deliver the expanded material to a receptacle *I*. From this it is discharged into a tube mill *J* with a suitable amount of water to facilitate the grinding of the material and the consequent agglomeration of the rubber particles. From the tube mill the material is discharged into a vertical cylindrical receptacle *K*. The fibrous refuse is withdrawn through the outlet pipe *L* and utilized for the production of paper or press board. The separated rubber is removed from the receptacle *K* and processed for delivery to the rubber goods manufacturing trade as refined first quality crude gum.

Another Tire-Saving Varnish

A German inventor has applied for a British patent on a formula for an elastic varnish for retarding the aging of tires and other rubber articles by air and light. He uses a mixture of French chalk or soapstone and a gum solution with or without a solution of cellulose. The varnish is thinned with benzol and applied in one or more coats.

Uniting Rubber to Metal

JOSEPH ROSSMAN

Rubber and metal have been combined in many ways to give us valuable industrial products. The foremost example that might be mentioned is the rubber coated electric wire. This combination of materials is quite simple but it required an inventor to show the world how it could be done. Rubber has since been attached to many other metallic objects, such as tanks, plates, solid tire rims and a multitude of electrical devices requiring insulation.

IT has been found that rubber will not adhere tenaciously to iron or steel after it is vulcanized and that it will have a tendency to peel off the metal. Many patents have been granted for solving this problem.

At first various cements were used to unite rubber to metal but the union was always imperfect and after a short time the rubber would separate from the metal.

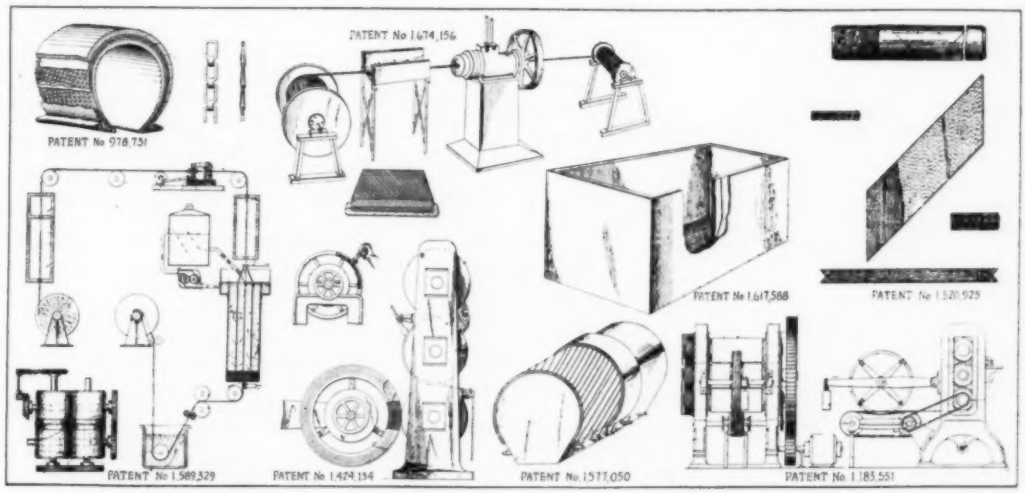
U. S. Patent No. 259,721 modified this procedure as follows: The portion to be covered with rubber is first freed from all oxidation, scale or other impurities by subjecting it to a pickling process in diluted sulphuric acid. After the surface has been sufficiently acted upon by the acid it is washed and quickly dried to prevent oxidation. It is then covered with one or more coats of rubber cement consisting of rubber dissolved in naphtha. This cement will adhere to the metal and protect it. A thin sheet of unvulcanized rubber is then secured to the cemented surface by pressure and heat. A plain sheet may be covered with the thin sheet by the use of a hot roll, but dished or irregular surfaces must be subjected to pressure in heated dies. To this thin sheet of rubber is cemented the rubber proper, which may be of any form or thickness required, and when trimmed and embossed, or otherwise ornamented, is finished in the plastic state. The whole is then vulcanized.

Plating With Copper

Another old U. S. Patent No. 215,034, granted in 1879, unites rubber to metal by interposing between the metal and the rubber a film of any metal which at the temperature of vulcanization has a tendency to unite with the sulphur contained in the rubber compounds. The most suitable metal films are of copper and silver, of which copper is the easiest and the cheapest to apply. Lead and zinc may be used, but it is difficult to obtain a suitable deposit of these metals for the interposing film.

The metallic article is first covered with the film selected and the rubber compound applied in the usual way and vulcanized. The best method for producing a film of metal upon the article to be covered with rubber is by electroplating, or in some instances by dipping. In covering iron, steel or tin articles with copper dipping is preferable. A weak solution of sulphate of copper is made, say two or three ounces of the crystallized salt to the gallon; and this solution may be acidulated with sulphuric acid, about half a gill of strong acid to the gallon. The film should be very thin, and therefore the article should be immersed in the solution only a sufficient length of time to produce a bright copper colored deposit. If allowed to remain too long the copper may not adhere to the metal beneath, and the pellicle may be too thick to produce a good adhesion between the metal and the rubber.

When electroplating is used for producing the film, care should be taken that the film adheres to the metal underneath it, and that too thick a film is not deposited. Since the interposed film must be very thin, it should not be of the same metal as the metallic article beneath. For instance a film of copper cannot successfully be interposed between rubber and a copper article or an article containing much copper in its composition. The difficulty is overcome by first coating the article with tin, nickel, iron or other suitable metal foreign to the thin film, and then proceeding as if the article to be united with the rubber had originally been wholly of iron, nickel, tin or other suitable metal.



Many patents have been granted for applying other metallic coatings to metal objects to insure adhesion of the rubber. The U. S. patents to Daft, such as No. 1,057,333, electroplate the article with various metal alloys.

The Use of Bakelite

Bakelite can also be used to bond rubber to metal because rubber will adhere to bakelite in the molding operation, and being strong and hard, it becomes mechanically attached to the metal surface. According to U. S. Patent No. 1,250,-959 a bond comprising a phenolic condensation product such as bakelite can be used for uniting rubber to metal. Such products are commonly formed by the reaction of phenol and formaldehyde, or other substance containing the methylene radical in condition to unite with the phenol, and in their final state, when suitable proportions of reagents have been employed, are hard, strong and infusible. These products will unite with either soft or hard rubber under sufficient pressure and heat, whereby a large variety of rubber articles, such as various cushioning devices, are united to supports formed of materials to which it is ordinarily difficult to secure soft rubber.

The invention may be practised in many ways and in the formation of a variety of articles. Thus, in the manufacture of door stops and rubber cushions for crutch tips, chair legs, etc., the soft rubber may be autogenously secured to member formed of a phenolic condensation product with an external thread which may be screwed into a suitable socket in the chair leg or other support. Or the condensation product member for the rubber article may have the head of a metallic screw inset in the composition and molded therein, the screw being screwed into the article to which the rubber device is to be secured.

The invention may be applied to the tires of vehicles. Thus, a solid rubber tire may have a backing of condensation product autogenously secured to it, and bolts having heads embedded in the condensation product may be used for securing the tire to the felly. As another example the condensation product backing may be fitted on a metallic rim and securely held by screws passing through the rim into the condensation product. Soft rubber rollers and small rubber tired wheels for trucks may be formed by molding the article, with a layer of condensation product interposed between the hub or shaft of metal and the outer layer of rubber, the condensation product and the rubber becoming autogenously bonded together and the condensation product firmly binding upon or shrinking about the hub or shaft in the process of manufacture. As another example, a non-skid surface may be provided on tire treads by autogenously securing protuberances of a phenolic condensation product to the tread of the tire, to which metal tread plates may be secured, if desired.

Solid Tires

The union of the rubber body of a solid tire to the metal rim has presented many difficulties. The rim is provided with a grooved surface around which thin layers of the hard rubber compound are wrapped and followed by layers of soft rubber compound until the proper thickness is attained. The excess rubber is removed by trimming, careful weighings being taken of the parts removed until the tire is down to the volume required for the size being manufactured. The U. S. Stevens Patent No. 1,276,821 extrudes a base of hard rubber which is wrapped on the rim about which an extruded cushion strip of rubber is applied.

According to U. S. Patent No. 1,183,551 a number of calendering machines are provided with apparatus for rolling rubber compound upon the solid tire rims, one complete machine being provided for each of the different compounds to be incorporated in the tire. The rim is then placed upon the machine feeding the compound to be used for the base of the tire and put in operation. The strip of compound passes between the rolls and upon a traveling wire belt which rolls it upon the rim causing the latter to revolve through frictional contact.

When the rubber has been rolled upon the rim to a sufficient thickness, the rim is removed and placed upon the second machine which applies the compound for the outer part of the tire. After this has been rolled upon the rim, the rim and tire are placed in a mold and vulcanized.

Lining Metal Tanks

U. S. Patent No. 1,367,231 comprises a process of lining the inner surface of a tank with hard rubber; which comprises covering the inner surfaces of the tank with a layer of soft rubber while it is in a plastic condition; covering the layer of soft rubber while it is in a plastic condition with a layer of hard rubber also in a plastic condition, applying steam under pressure to the interior of the tank to vulcanize the layers of hard rubber and soft rubber together, the soft rubber being forced to adhere to the inner surface of the tank, and applying water under pressure after vulcanization to keep the rubber lining adhering to the tank while the lining and tank cool.

In U. S. Patent No. 1,570,445 a steel tank is lined with an acid-resisting rubber lining. The inner surface of the tank is cleaned to remove scale, grease or oil, and then painted with a cement consisting of about one-third crude rubber dissolved in gasoline, one-third quicklime and one-third sulphur, to which is added a small percentage of hard rubber accelerator. Two or more coats of the cement may be applied and each coat allowed to dry to a tacky condition On this coating of hard rubber cement there is then applied in sheet form the lining consisting of crude rubber, compounded with any suitable filler such as zinc oxide and only enough sulphur to vulcanize the compound to soft rubber. Preferably, no accelerator is used in the soft rubber compound. When the tank is completely lined, steam at 45 pounds is turned into it, and the rubber allowed to cure for three hours, the bonding layer of cement vulcanizing to hard, and the lining to soft rubber. To prevent the formation of blisters, the steam is displaced by cold air at the same pressure, and the tank allowed to cool for several hours, after which the compressed air is released and the lined tank is ready for use.

In constructing lined tanks or composite products in accordance with U. S. Patent No. 1,617,588, a thin calendered sheet of a heat-plastic rubber isomer is interposed between layers of material and the two united by heat or pressure, or both. It is preferable to apply the heat-plastic rubber in the form of a cement, in which case the heat-plastic should be washed in water to remove any residual acid. A cement composed of 5 to 20 parts by weight of the heat-plastic rubber isomer in 100 parts of solvent, such as benzol, gasoline, etc., is suitable for this surface. Thus, in uniting rubber to iron or steel, a thin calendered ply of the heat-plastic is superposed on a surface of the rubber or the metal, or both, and the two are united by heat and pressure. In certain cases, it may be preferable to apply a rubber cement to the rubber and a cement of the heat-plastic to the metal. In either case the rubber and metal are pressed together until the cements set and the built-up structure is preferably, although not necessarily, subjected to heat to unite more firmly the material into an integral structure.

The inner surface of the tank is cleaned by sand blasting and two or more coatings of cement are applied made up of 5 to 20 parts by weight of heat-plastic rubber isomer dissolved in 100 parts of benzol, or other organic solvent, permitting each coating to dry before applying a successive coating. A coating of curable rubber cement is then applied, preferably of the same vulcanization characteristics as the rubber lining, and while the rubber cement is still tacky a curable rubber lining is rolled on, care being taken to avoid the entrapping of air between the shell and the lining. The tank is now covered and sealed, and live steam admitted at a temperature and pressure adequate to vulcanize the rub-

ber lining, the temperature and pressure of the steam also acting on the heat-plastic layer to augment its bonding tenacity both to the metal shell and to the rubber lining.

The tough, non-friable, tacky rubber isomer is formed by the reaction of an intimate mixture of 7½ parts of p-phenol sulphonic acid and 100 parts of rubber when heated in a compact mass from 4 to 10 hours at 250 to 290° F., the time depending upon how rapidly the batch heats up sufficiently to initiate a vigorous exothermal reaction, the temperature of the material rising to 390 to 430° F., and the heating being preferably continued for about two hours beyond the peak.

A similar product is formed by the reaction of 4 to 5 parts by weight of concentrated sulphuric acid (sp. gr. 1.84) intimately mixed with 100 parts of rubber and 30 parts of pine tar, when heated in a compact mass from 5 to 7 hours at 268° F., during which heating similar exothermal temperature rises occur. The quantity of pine tar may be varied from 2 to 50 per cent of the rubber contact. Instead of pine tar, other organic softening agents, such as phenol, cresol, xylene, toluene, phthalic anhydride, paraffin, etc., may be employed in a similar manner.

Metallic Fabrics for Tires

Attempts have been made to employ a metallic fabric in the construction of pneumatic tires. The chief difficulties have been: first, to obtain a metal fabric that will flex without breaking; second, to obtain complete and perfect cohesion between the metallic fabric and the rubber; and third, to prevent the destruction of the metal fabric by the action of the sulphur employed in the process of vulcanization.

According to U. S. Patent No. 978,731 the fabric is not made of a single wire, but from an articulated metallic thread which consists of a very light and flexible chain of steel or other suitable metal inclosed in a sheath of cotton or like textile material. The sheath may be proofed with rubber or other adhesive material wound in a spiral around the sheath both for the purpose of making the wrapping homogeneous and for the purpose of enabling the rubber forming the exterior of the tire to adhere to it. The sheath may be formed by winding the rubber band directly on the chain, the wrapping of rubber being free of sulphur or other vulcanizing substance capable of injuring the metal by forming a sulphide or otherwise.

As an alternative construction, the chain may be embedded in a cover of rubber or other adhesive substance, a convenient method being to pass it through a vat of rubber solution a sufficient number of times, allowing it to dry between each dipping, to give it a coating of desired thickness. It may also be finally drawn through a die which will compress the rubber into the interstices of the chain, remove any excess of rubber, and give the thread a uniform section. The articulated metallic thread can either be woven into a fabric in the ordinary manner using the thread either for both the warp and the woof, or for one, and a cotton or like thread for the other, or alternatively the articulated metallic thread may be employed in the manner well known in the construction of cord tires in which the fabric is made up by laying or winding the thread in layers over one another, the threads in one layer crossing the ones in the adjacent layer in contra-distinction to interweaving them. This method may be employed either in directly building up tires or in the preparation of sheets of fabric for such purpose.

Another U. S. Patent No. 1,577,050 March 16, 1926, constructs a fabric of vulcanizable rubber and strands of wire. The wire is laid on the bias to the sheets of rubber. These wires are laid singly or may be wound backwards and forward, leaving a loop at each end where it turns back, or may be wound around a drum or made in any other way. A space is left between each wire, rubber sheets already prepared for vulcanizing are laid on each side of the wires and firmly pressed together, so that they meet in the spaces between the wires and fill such spaces. The rubber adheres together, forms a homogeneous whole and firmly locks the wires in place. This rubber metal fabric is thus ready to be used by the tire manufacturer in any way desired.

U. S. Patent No. 1,520,925 provides cords having metallic centers or cores therein, the cores being covered with a frictioning material and then having a covering of cotton, wool, or other suitable material woven or braided thereon, the metallic cores being preferably made up of a number of small strands of wire braided, woven or twisted together, or otherwise fabricated into the form of a single cord. These individual cords are then fashioned into a fabric which is used in the manufacture of the tire carcass, or if preferred, these cords may be woven together in the form of a tire carcass in the usual manner without first being woven into a fabric.

Coating Electric Wires

According to U. S. Patent No. 1,674,156 the commonly accepted method of manufacturing rubber insulated electric wires comprises two essential steps. One is to apply a cylindrical layer of rubber compound to the bare wire. The second step is to vulcanize the layer of rubber. The composition of the rubber compound that is applied to the bare wire may be varied widely. The commonly accepted methods of vulcanizing the rubber vary. One of the methods used is to place the wire in the form of a coil in a pan of powdered talc, to place the pan and coil in a closed vulcanizing chamber and to pass steam into the chamber. The wires resulting from this process have a pitted surface and the body of the rubber shows voids. The cross section of the wire varies in form on account of the temporary fluidity that the rubber acquires during vulcanization, and the conductor is not always concentric with the layer of rubber. This process therefore is not adapted for use with soft rubber compounds, *i.e.*, rubber compounds that have a high percentage of rubber. Sometimes the expedient of enclosing the rubber covered wire in a sheath of braiding prior to vulcanizing is resorted to. Others enclose the rubber covered wire in a sheath of metal foil which is removed after vulcanization.

The U. S. Patent No. 252,739, to Clark, dated January 24, 1882, shows another method of vulcanizing rubber covered wire. This relates to the manufacture of telegraphic or telephone cables which are composed of a plurality of wires embedded in rubber and thereby insulated each from the other. The sole purpose of the patent is to insure that the wires remain straight and that the interposed portions of rubber between them remain approximately uniform in thickness. To this end the patent disposes the rubber covered cable in a mold which maintains it in a practically straight condition from end to end of the mold whereby the proper and relative positions of the wires are maintained. This mold is then placed in a chamber open at the ends with the mold protruding through the open ends. Steam pipes which enter and leave the oven through the same opening serve as supports for the mold which is about ten feet in length. A long cable is vulcanized in successive portions. The cable is large in diameter as compared with the length of the mold, the two halves of which are held together by thumb screws. The pressure to which the rubber is subjected is small.

In a recent U. S. Patent No. 1,674,156 the rubber covered wire is placed in a mold the parts of which are clamped firmly to withstand high internal pressures. The size of the groove is small as compared with the length of the mold. The mold and contents are heated to vulcanizing temperature. The result is that high pressures from 300 to 400 pounds per square inch are developed within the mold.

The first step in the process is the application of a cylindrical layer of previously prepared rubber compound to the bare conductor. The rubber covered conductor then passes

through a trough containing talc and is wound on a drum. The talc covers the outer face of the soft warm rubber and prevents sticking when wound on the drum. The drum is rotated very slowly by a small round, slipping belt. The wire is guided manually to form layers on the drum. A sheet or covering of fibrous material is now applied to the rubber covered wire. This interlayer may be applied in the form of a braiding, a spiral wrapping or in any other form desired.

The next step in the process is semi-vulcanizing the first layer of rubber. This may be done by the dry heat process. The rubber covered wire is wound on a large drum that revolves on a horizontal shaft in bearings within a large closed oven, which is heated for two and one-half hours, gradually raising the temperature to 235° F. The wire is now again passed through the apparatus where it receives a second layer of rubber compound. The vulcanization of the rubber on the wire or cable is carried out while it is clamped in grooves between two plates. The plates with the wire between them are placed in a heating chamber where a heating fluid is admitted and the temperature of the wire or cable gradually raised to vulcanizing temperature. The grooves in the two plates are such that when the wires or cables are clamped between the plates they fill the grooves. When heated the rubber becomes semifluid, expands in volume and is subjected to high pressure. The high pressure compresses and condenses the rubber and causes some of it to flow between the plates and enter the overflow grooves.

Electrodeposition of Rubber

Rubber can be united to metal by the electrodeposition of latex or other emulsions. The rubber particles in latex are negatively charged and they can consequently be deposited by electrolysis to form layers of considerable thickness. Pigments, sulphur and accelerators can also be mixed with the latex and deposited on the metal. The coating on the metal depends upon the anode over-potential for oxygen which must be carefully controlled. Metal sheets or wire can be coated in this way.

U. S. Patent No. 1,589,329 to Sheppard and Eberlin discloses a method for electrodepositing rubber on metal wire. Their U. S. Patent No. 1,476,374 discloses broadly the process. It consists in preparing a rubber emulsion to which is added sulphur, lamp black and an accelerator such as aniline sulphate. The article to be coated is immersed in the emulsion and connected to the line to form the anode. A suitable cathode is placed in the bath which is kept at ordinary warm temperature. A direct current at 110 volts is used.

When the surface has a coating of the desired thickness, it may be removed from the bath and washed with water, preferably hot water. If the vulcanizing agent is in the deposited coating in a sufficient amount, the vulcanization of the coating can be carried on by packing in a vessel and heating in accordance with the usual practice. If the coating does not contain the vulcanizer, or if it contains only an insufficient amount, then the packing in the vessel with a suitable separating powder will include a vulcanizing agent, as will be apparent to those skilled in the art. Any well known method of vulcanizing can be employed.

(To be continued)

Two-Solution Rubber Cement

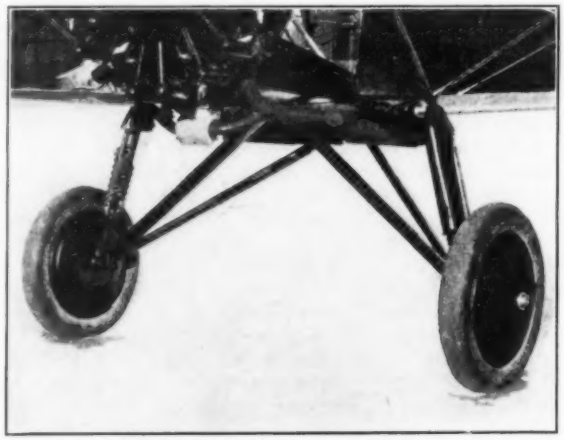
A 2-shilling two-solution rubber cement is being marketed in England. It is used for making vulcanized waterproof joints in a wide range of repairs, and is put up in twin jars with metal presscaps, one containing "Solution A" having an activator and the other with "Solution B" containing sulphur. When blended and used as per directions an air-cured joint is said to be easily made, and vulcanization may be hastened by applying a hot iron to a joint for a few moments.

Rubber-Hydraulic Landing Gear

THE struts of the landing gear of an airplane require to be so arranged that they can take loads in any direction. In the Stearman rubber-hydraulic landing gear here illustrated the two inclined struts are hinged at the center of the fusilage, and take up the side and backward loads. The outer strut is a shock absorber which compresses through several inches to lessen the shock. The wheels thus swing up and outward as the compression strut is shortened. After many stages of evolution the compression struts now combine a hydraulic system with a rubber spring system.

The Stearman system is a combination of shock cord and hydraulics. The taxiing loads are carried on rubber cord and the initial load of landing is absorbed by the hydraulic portion of the gear. The rebound of a plane when landing on the usual type of rubber shock absorber is entirely eliminated in the Stearman type because the hydraulic unit comprises a piston with a small orifice operating in a cylinder filled with oil. As the strut compresses, the upward travel of the piston in the cylinder forces the oil through a narrow orifice thus dissipating the energy of the shock by converting it into heat without the possibility of its reconversion into energy of rebound. After the landing shock has been taken up hydraulically the taxiing loads are received by the rubber cord in tension.

The rubber cord is a continuous piece wound around a series of pins welded to the frame of the gear and extended as one part of the compression strut. The part fixed to the wheel moves upwardly relative to the part fixed to the rest of the airplane. The greater the travel in compression the less the load actually transmitted to the fusilage. In the Stearman gear the total travel is 8 inches of which 6 inches is taken by the hydraulic portion. The shock cord also



Stearman Airplane Landing Gear

holds the hydraulic cylinder in a cock position from which the landing load is absorbed when the ship is let down.

The accessibility of the shock gear together with its stream line possibilities and excellent performance record makes this shock absorbing system one of outstanding merit and utility. It is not an accessory but a unit provided on all Stearman airplanes.

NOTE—Data and illustration from The Stearman Aircraft Co., Wichita, Kan.

THE GENERAL ELECTRIC CO., SCHENECTADY, N. Y., announced a 13 per cent increase in orders received during 1928 as compared with 1927.

Optimistic Rubber Outlook

Industrial Leaders See Broader Markets and Well-Sustained Progress in 1929—Gains in Stabilization, Sounder Financing, Low Material and Manufacturing Costs as Encouraging Factors

IT has long been customary at the outset of a year to ask the question, "Do the ensuing twelve months hold for us generally or individually a better prospect than the preceding year?" That it is a reasonable query is evidenced by the fact that even astute industrial leaders, adept in reckoning well in advance, and the soundness of whose deductions regarding the business outlook is rarely questioned, also welcome the views of others on affairs of such vital concern. Especially valued is the opinion of those leaders in their own lines of endeavor who, through exceptional ability and enterprise have won outstanding position, trusting perhaps for confirmation of their own anticipations, or maybe hoping that their own inferences as to the future state of trade may even be proved as much too conservative.

So far as early surveys indicate, the year 1929 at least affords little comfort for the confirmed pessimist. Indeed, on the other hand, the consensus of opinion of those best fitted to gauge the trend of trade is that the prospects are very reassuring. The new year at least starts well. It is free from a presidential election as well as other disconcerting elements that menaced business in 1928. Yet the disquieting conditions did not prevent the United States from doing a larger domestic business in 1928 than ever before and from making an exceptional gain in foreign trade, exports alone being over $5,000,000,000, the largest for any year since 1920, and well indicating American ability to compete with other industrial nations in marketing fabricated products.

Favorable Legacy of 1928

Largely to the fact that the seeds for better conditions were sown in 1928 may be ascribed the good flying start with which 1929 was received. New year conditions have been helped because in 1928 shop and store inventories were greatly reduced; tremendous write-offs were taken that luckily will not have to be repeated; much progress was made in waste elimination, simplification, and standardization; substantial advance was made in factory employment at good wages and with consequent increase in general buying power; largely through wise management, losses through labor troubles were very small, in fact, relations between capital and labor were bettered in many ways; and, while a decided gain was made in productive efficiency, there was also appreciable improvement in the still relatively wasteful process of distribution. Rubber manufacturers, long eager for stable and moderate prices on essential raw materials, were comforted with the removal of restriction on British exports of crude rubber, the average price of which was not only about 25 per cent lower in 1928 than in 1927 but actually half at the end of what it was in the beginning of the year. Even cotton prices kept well within a reasonable range for the year.

Although at the outset 1928 business was at the lowest point since 1924, during the year it gathered such strength as to not only recover from a severe setback in 1927 but even scored substantial advances. Indeed, it had at the close of 1928 acquired such a momentum as to warrant the belief that, barring any unlooked-for disaster, the forward swing could not fail to continue, with well-distributed prosperity and unabated vigor, well past the middle of the present year. The credit situation is unmistakably improving, and no worthy enterprise need fear lack of ample funds. A better understanding between government and business is not the least encouraging feature for 1929.

Rubber Situation Good

Business experts are in general agreement that the outlook for the rubber industry is uncommonly favorable. In common with automobiles, metals, oil, fertilizers, radio, and motion pictures, the analyst-statisticians put tires on the list of products which should be again in the money-making class early in 1929. The indices, they say, favor not only larger production with well-sustained prices for this class of commodities, but 1929 is more likely to be marked with steady prosperity than with hectic booms or destructive competition. More than ever, it is said, will industry demonstrate earning capacity strictly on the basis of management. One of the many optimists is Babson, who declares that the tire business is not only fundamentally sound, but is at a point from which the only trend can be forward.

President P. W. Litchfield of the Goodyear Tire & Rubber Co., Akron, Ohio, is one of the many captains of industry who looks forward to a very successful year. He informs the INDIA RUBBER WORLD that trade requires immediate expansion by his company of facilities for production from 81,000 present capacity to 90,000 tires daily. Such increase will be distributed among existing American and foreign Goodyear plants, to be supplemented with the output of the Goodyear plant now being built in the South and which will have an output of 5,000 tires daily. The output at the Los Angeles plant is being rapidly stepped up from 10,000 to 12,500 tires daily.

Greater volume of business, continuous improvement in the value of rubber stocks, probable higher rubber prices and better credits are predicted in 1929 by William O'Neil, president of The General Tire & Rubber Co., Akron, Ohio.

"I would not be surprised if the rubber industry were to establish new records in both production and sales during the coming year," said Mr. O'Neil. "The rubber business was never on sounder ground than now. I see no serious reason why we should not continue to progress and enjoy good business and prosperity. Steady growth of the automobile industry plus increased demand from over-seas markets and a prosperous era generally should insure the tire industry a good year.

Other 1929 Expansion Plans

President J. D. Tew of The B. F. Goodrich Co., Akron, Ohio, states that 1929 tire production at the Akron plant will be increased about 15 per cent, mechanical goods 15,

and footwear 25 per cent. At the Los Angeles plant facilities and production will be increased 50 per cent as speedily as possible. The Goodrich plant at Kitchener, Canada, is having its floor space doubled, its tire capacity raised 25 per cent, and its footwear capacity increased 33⅓ per cent. Carry-over of 1928 production may curb somewhat 1929 production, but on the whole the tire output may be increased about 10 per cent. In a field less spectacular, that of mechanical goods, important improvement is expected owing to the many new and practical uses being found for rubber materials. Goodrich mechanical goods production in Japan has been very encouraging and tire making is likely to be taken up there in July. The English and French Goodrich factories have also been giving a very satisfactory account of themselves, adds President Tew.

Looks for a Banner Year

President W. G. Klauss of India Tire & Rubber Co., Akron, O., looks forward to 1929 being the banner year in the company's career. General Sales Manager F. L. Ryan says that while the company's success can be largely attributed to its policy of steadily improving its products, a large share must be credited to the new working agreement which the company effected with its distributers during 1928.

President and General Manager S. T. Campbell of the Aetna Rubber Co., Cleveland, O., finds much gratification in the prospects for 1929, during which period several new large-volume items will be added to the standard products. A steady growth, likely to be much accelerated in 1929, is noted in steering wheel output at the Ashtabula, O., plant; and there has also been installed at the same works equipment for making rubber flooring for which much business is expected in 1929.

Increased Sales Are Assured

Eberhard Faber, president of Eberhard Faber Rubber Co., Newark, N. J., is convinced that prosperous conditions will prevail throughout the rubber industry during the present year; and, with a considerable increase in sales assured, his company has recently made several notable changes and enlargements in its plant. Business in 1929, he adds, can be maintained on a more stable plane than ever if manufacturers will always strive to maintain as a sales policy the utmost good will of the trade.

United States Rubber Co. representatives in various parts of the country unite in declaring that the new year offers nothing but encouragement. The company, it is stated, was never in a stronger position, its numerous plants were never better equipped or more efficiently managed for their wide diversity of products, and its distributing organization was never so well able to extend sales. The executives look forward to a record year in all departments, with a decided increase not only in unit sales but in net profits.

Corduroy Tire Co., Grand Rapids, Mich., greets 1929 with exceptional confidence. C. S. Dickey, treasurer and general manager, feels justified in taking a roseate view because the entire plant has been so thoroughly modernized of late that it can be ranked in the forefront of tire works that produce quality goods at minimum cost. Much of the equipment to enhance efficiency is said to be not only unique but designed to handle a much greater volume of business, of which considerable is expected in 1929.

Cheerful But Advises Prudence

Vice President and General Manager N. Lincoln Greene of the Clifton Manufacturing Co., Jamaica Plain, Mass., who has seen the output of his concern double within four years, is one of the conservative leaders who, believing that mere big business is not everything, is disposed to caution against undue expansion. However, he not only sees nothing disturbing for a long way ahead but, basing his observations on wide study and long experience, believes 1929 will be a very good year.

President F. B. Williamson, Jr., of The Whitehead Bros. Rubber Co., Trenton, N. J., while confident that 1929 will be an excellent year for business, trusts that proper restraint will be exercised. The best and most enduring results will be obtained, he advises, if leaders in the industry do not allow themselves to be tempted to take advantage of business peaks to abnormally enlarge production and overstimulate distribution, the outcome of which, he says, could be only acute competition and lower profit margins for all concerned.

National prosperity is firmly established; industrial conditions are most encouraging; farmers are better satisfied with their markets; demand for American-made goods is increasing; standards of living are rising; home consumption of merchandise is expanding. These reasons are given by Harvey S. Firestone, president of The Firestone Tire & Rubber Co., Akron, O., for predicting that 1929 will be a record year for the rubber industry, which he says is facing the brightest prospects it ever has had.

Molded Synthetic Plastics

RUBBER manufacturers in England, especially those in the hard rubber line are adding to their plants equipment for producing the great variety of molded synthetic plastic articles produced from bakelite and similar synthetic resins. Such moldings have great commercial possibilities and may be developed as an important section of the rubber industry. It has been found practically that hard rubber and bakelite goods are not necessarily competitive for all purposes but the lines are supplemental owing to the distinctive characteristics of the two materials employed. By conducting the manufacture of each in the same plant the manufacturer can supply the more suitable material for a given purpose and to develop each for the special uses for which it is best suited.

The manufacturer of molded synthetic resin articles receives the molding materials as a prepared powder comprising the resin mixed with suitable fillers such as wood meal or asbestos. A characteristic of synthetic resin powders is that there is a final point of heating at which they set hard and cannot thereafter be softened by the further application of heat. This is distinctly different from the case of rubber as continued heating causes it to become harder. It also explains why bakelite moldings can be ejected hot from the press without distorting.

It is possible to employ various colors in synthetic resins which are impractical in hard rubber. It is interesting to note that in the comparatively few years that bakelite or synthetic resin has been employed in the industrial field the world's output of artificial resinous products has reached the present total of 13,000 tons per year, of which Great Britain is said to be manufacturing about 600 tons.

No less interesting and important is the universal adaptability of the material for the most diverse uses both ornamental and useful, alone or in combination with metallic inserts for the reception of electrical or mechanical connections.

Says Oxygen Makes Rubber Tacky

Although the use of internal masticators and mixers is rapidly increasing, R. W. Griffiths, a British technologist, contends that maximum tackiness in uncured rubber can be obtained only by allowing it to come freely in contact with atmospheric oxygen during mastication, and hence only with the open type of masticator can the most efficient sticky product be produced.

The National Automobile *Show*

THE Twenty-ninth Annual National Automobile Show was held under the auspices of the National Automobile Chamber of Commerce in Grand Central Palace, New York, N. Y., January 5-12, 1929. The exhibition halls of the building were newly decorated and a grand stairway erected for the occasion to give access to the second floor from the rear of the main hall. Forty-nine car manufacturers were represented in the vehicles on display, while 176 manufacturers of accessories occupied a large proportion of the exhibition space with a multiplicity of devices for the convenience and profit of the motorist and repairman alike.

The automobile show of each succeeding year marks a steady advancement in the development of powerplant, chassis and body, together with refinements that add to the comfort and convenience of operation of all types of cars. The old type of touring car has virtually disappeared having been displaced by the various styles of enclosed bodies.

The official statement by the National Automobile Chamber of Commerce is that closed car production in 1928 was 85 per cent of the whole. This is a gain of 5 per cent over the percentage in 1927. No outstanding departures in design were shown but perfection in the execution of mechanical features and artistic refinement in body lines and color were evident on every side.

A new feature of the show as compared with other years was the exhibit by three makers of English cars, namely: the Vauxhall, Daimler, and Austin. These were exhibited in closed types and contrasted strikingly in certain features with American makes of corresponding styles.

Fabric covered bodies are popular in England and it was said that a third of all closed cars produced there are so made. It is claimed for the fabric body that it is lighter, entirely noiseless from vibration and in case of injury readily repaired by replacement of the broken fabric with a new piece of the material.

Quite out of line with American practice is the right hand steering feature on these cars which would make them an oddity on the roads in this country where all cars have left side drive.

Notable among the English cars was the baby Austin of 7 horse power, 900 pounds weight. This is said to be the most popular of English made cars and is being produced at the rate of 1,000 per week. Although very small it is highly practical especially by reason of its extreme economy of operation.

In point of popular interest and value were the numerous exhibits displayed in the accessories and repair shop sections. These practically equalled that of the car exhibits in attendance. Mechanical and electrical devices naturally predominated in this section with here and there an item in which rubber in some form appeared.

A. Schrader's Son, Inc., Brooklyn, N. Y., displayed their universally used tire valves and tire gages. Both of these devices are unique and simple in design and are in fact watch-like in workmanship and performance. Rubber is embodied in the construction of the tire valve and functions critically at three points in making the valve tight even against 250 pounds interval pressure.

In the shop equipment section the General Electric Co., Schenectady, N. Y., displayed electric motors and various accessory devices adapted for modern shop practice in building and repairing automobile and general machine work.

PRODUCTION

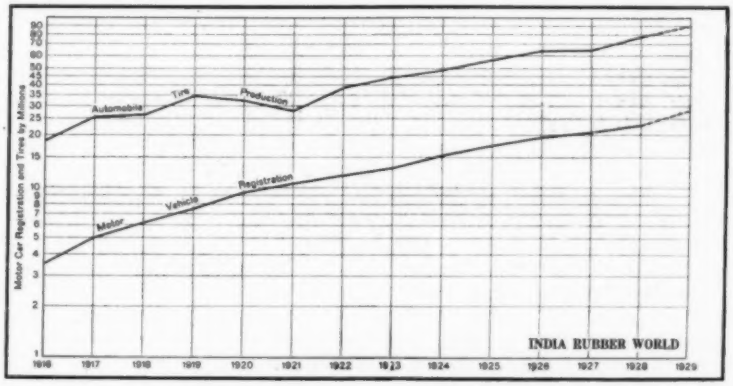
Cars and trucks produced in U. S. and Canada	4,630,000
Cars	4,044,000
Trucks	586,000
Production of closed cars	3,441,600
Per cent closed cars	85%
Tire production (number) in U. S.	78,500,000
Wholesale value of rubber tires for replacement	$670,000,000

REGISTRATION

Motor vehicles registered in U. S.	24,750,000
Motor cars	21,630,000
Motor trucks	3,120,000
World registration of motor vehicles	31,725,000
Per cent of world's automobiles in U. S.	78%

MATERIALS CONSUMED

Gasoline consumed by motor vehicles, 1928 (gals.)	10,860,000,000
Gasoline used by motor industry	80%
Motor oil consumption (gals.)	434,000,000
Crude rubber used by motor industry, 1928 (lbs.)	814,000,000
Cotton fabric used in tires, 1928 (lbs.)	299,500,000



Automobile Registration and Tire Production 1916 to 1928. 1929 Estimated

Laboratory vs. Service Tests

Rubber compounders should be wary in drawing set conclusions from results obtained by various laboratory tests. While the collective results from all types of such tests serve as a guide in reconstructing an old compound or designing a new one, the true practical merit of a modified or new compound is measured by its performance in service. In many instances compounds have been adopted for regular production based on particularly good results obtained in a single laboratory test, only to fail in service when a test of the material in a limited amount of goods would have demonstrated its suitability.

Annual Dinner and Meeting

THE Twenty-ninth Annual Dinner of the Rubber Association of America, Inc., was held in the Grand Ballroom of the Hotel Commodore, New York, N. Y. on the evening of January 7, 1929. Eight hundred and fifty members and guests were present. After the dinner, Paul W. Litchfield, president of the Association delivered the following address:

President Litchfield's Address

The past year in our history has been rather a hectic one on account of the drastic change in the crude rubber situation. You know that the prosperity of our industry is reflected each year more largely by the changes in the crude rubber market than by almost any other phase of the business. Any manufacturing economies or policies have very little effect compared with what may happen in the crude rubber market during the year.

We started in 1928 with rubber stable around forty cents a pound. It had been maintained around that level for about a year, owing to the operation of the Stevenson Restriction Act, with which we are all familiar. Stabilization had also been greatly helped by the operation of the American pool organized under our own laws. The industry was running along smoothly on that basis when in February, without warning an intimation was given that there might be a change or modification of the Stevenson Act. In April came the sudden and almost unexpected news that the Stevenson plan would be entirely done away with.

We knew that without the Stevenson Act in effect, and with a free market and the full potential supply of rubber available, a fair price would be probably around twenty cents a pound. With the uncertainty caused by the first official statement referred to above the price immediately dropped to the neighborhood of thirty cents, and with the final announcement it went down to twenty cents. You know what that did to this industry. The balance sheet of the first six months will give you a very clear idea of the effect on our business. That six months' showing is one of the most disastrous things we have had for a long while.

Now that the Stevenson Act is a thing of the past we can appraise it a little better than we could while it was in operation last year or the year before. The crude rubber industry has been a succession of shifting from high profits for the planters to almost no profit at all. In some cases plantations were run at a loss. There probably was a good reason for restriction of production in 1922 when that plan was put into effect. The planters undoubtedly deserved from the British Government some measure of protection against the oversupply and the consequent low price of crude rubber. The Stevenson Act sought to accomplish that, and if it had been a well thought out plan it would not have done so much harm. But with the inelasticity of the plan, together with the taste of the planters for higher prices, the expected and promised relief to prevent a runaway market did not materialize. We realized sharply then the significance of the dependence of America upon foreign sources for raw material over which she had no control.

It was probably a good thing for us that we did have that experience because it has taught us the importance of safeguarding against a recurrence of that situation in the future. For this purpose it is important that American manufacturers should control in one way or another the production of a supply of crude rubber which will be in fair proportion to their consuming needs, and in addition should have under their control a tangible stock of the raw material sufficient to tide them over periods of artificial shortage.

I think the formation of the American Crude Rubber Agency as an insurance of that situation was very beneficial, and I believe that the agency should be continued as a safety valve for our industry.

The law of supply and demand operates in this industry as in others. The demand reflects the needs of the industry, which, in this country at least, are constantly growing, and a balance can only be accomplished by carrying an inventory. That inventory, in this case, is a supply of crude rubber in an amount sufficient to give stabilization, and that supply to be within the control of the American industry.

When it was announced in April that restriction would be totally abolished on October 31, I think we all felt that the removal should have taken place more gradually. However, as things have worked out, I think that the sudden announcement of total abandonment with consequent full production on all plantations from April to November in anticipation of unrestricted shipments has worked out to our advantage. It has built up a supply which was very badly needed to replace

of the Rubber Association

the world's diminished stock, and to fill the needs of the large consumption during the past quarter. At this time the world's stock has been built up to a good point, and I think there has never been a time before when supply and demand have been better balanced.

Events during the operation of the Stevenson Act have also impressed on us the necessity of making good use of reclaimed rubber as a further guard against any future runaway markets in crude rubber.

Production problems in the past year have been largely decreased by mass production; and scientific development of processes has further reduced the cost of production of rubber manufactures—especially tires. We cannot look for very much improvement in that direction, at least for the present. I think from a production standpoint the two things which the industry is suffering most from are the wide diversifications in the tire industry, the high mold expense, and the large inventories of various types and sizes, which add largely to the cost of tire production and tire distribution. I am sure our friends, the automobile manufacturers, can help us a great deal in going ahead with the very commendable standardization program which they have started this year.

One of the principal difficulties now confronting us in the rubber industry is the question of distribution. It is quite probable that mass production is bringing about a decided change in methods of distribution, and some of the waste and inefficiencies must be corrected. Those who are successful in correcting them have nothing to fear. The lessons of mass production introduced into distribution, such as the full use of time, the full use of rents and space, having stocks well in balance and avoiding over-distribution must be followed, or else we will have a situation where the uneconomic distributer of manufactured rubber goods will certainly fall by the wayside.

I think if economies are brought into distribution along the same lines and methods followed by production, the industry has nothing to fear from that standpoint. The manufacturer cannot succeed unless his distributers make a profit. Instead of spending so much time and effort and money in getting distribution, we must join with the distributers in sharing the expenses to get the product to the consumer as economically as possible.

The Entertainment

On this occasion it was decided by the management to depart from the former custom of a program featured by addresses from prominent men, and instead there was a high class entertainment provided by prominent singers and dancers. George MacFarlane, the well-known entertainer, officiated as master of ceremonies and introduced the various acts that followed.

There was music by the Temple Orchestra; Albertina Rasch dancers; Daisy Jean, concert performer on the harp and cello; Vernon Trio, comedy dancers; Kilbourn Gordon, monologist; Giovanni Martinelli, premier tenor; Carl Randall and Virginia Watson, dancers; Harry Welsh, one man band. Weber and Fields in the well known characters of Mike and Meyer closed this very enjoyable program with their humorous skit.

Annual Meeting

The Fourteenth Annual Meeting convened at 11:30 A. M., January 7, 1929, in the West Ballroom of the Hotel Commodore, New York, N. Y. President P. W. Litchfield, presiding. The reports of the treasurer, general manager, and the budget committee being formally adopted, the election of directors followed.

The following were elected to the board of directors: G. B. Dryden, president, Dryden Rubber Co.; E. B. Germain, president, Dunlop Tire & Rubber Corp.; A. B. Newhall, vice president, Hood Rubber Co.; William O'Neil, president, General Tire & Rubber Co.; J. D. Tew, president, The B. F. Goodrich Co., to serve for three years. E. S. Boyer, president, American Hard Rubber Co., and C. D. Garretson, president, Electric Hose & Rubber Co., were elected to the board for terms of two years and one year respectively, to fill vacancies.

The meeting then adjourned, and the board of directors elected the following officers for 1929: President, F. A. Seiberling, Seiberling Rubber Co.; first vice president, Samuel Woolner, Jr., Kelly-Springfield Tire Co.; second vice president, A. B. Newhall, Hood Rubber Co.; general manager, A. L. Viles; secretary, A. D. Kunze; treasurer, W. O. Cutter; assistant treasurer, E. M. Bogardus; general counsel, Charles Neave.

Samuel Woolner, Jr.
First Vice President

F. A. Seiberling
President

The Marshall Studio
Arthur B. Newhall
Second Vice President

James D. Tew

Underwood Studios
C. B. Seger

A. L. Viles
General Manager

E. H. Broadwell

Paul W. Litchfield

W. F. Pfeiffer

Officers and Directors of
The Rubber Association of America, Inc.,
1929

C. D. Garretson

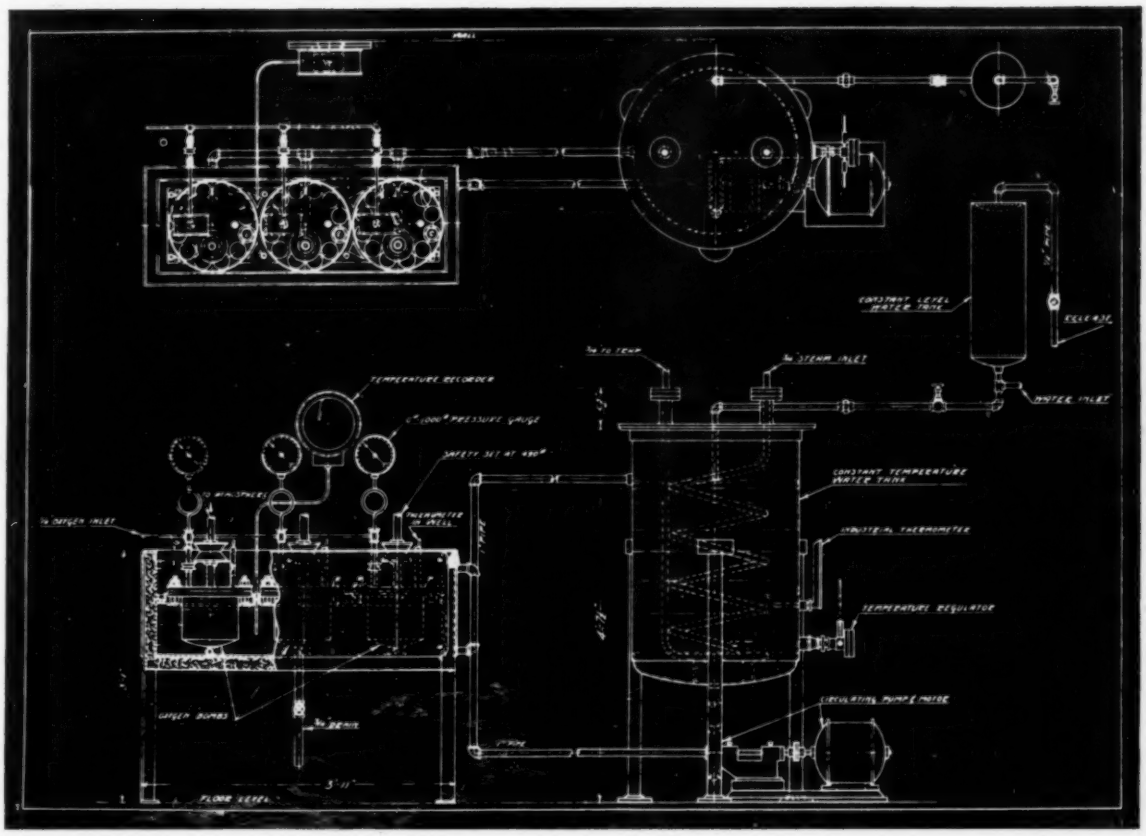
W. O'Neil

E. B. Germain

J. A. Lambert

H. L. McClaren

G. B. Dryden



An Improved Oxygen Bomb

The Rubber Laboratory of E. I. du Pont de Nemours & Co. Has Recently Installed Three Additional Oxygen Bombs in which Several Safety Features Are Incorporated. The du Pont Design Has Been Adopted By a Number of Other Laboratories and a Brief Description is Presented Here, Because of Its Interest to Manufacturers Who Are Contemplating the Installation of Additional Bomb Aging Equipment

THE Bierer-Davis oxygen bomb is undoubtedly one of the most valuable testing devices at the disposal of the rubber chemists. It is, however, less generally used than it would be if it were not for the danger that is involved in exposing rubber at elevated temperatures to high pressure oxygen. The hazards involved in operating oxygen bombs could be almost wholly eliminated by proper design of the bomb and safety disks and by heating the bombs in such a manner that it is impossible for the temperature to rise above the specified aging temperature, which is usually 70° C.

Accurate temperature control is essential in the operation of oxygen bombs not only because of the danger that is present if the temperature should rise too high but also because small variations in the temperature cause large variations in the rate of aging. It is known that rubber ages in the oxygen bomb approximately two and one-half times as fast at 70° C. as at 60° C. A variation in the aging temperature of only plus or minus 1° C. is quite serious because rubber ages approximately 22 per cent faster at 71° C. than at 69° C. Experience has shown that a water bath is the best way of accurately controlling the temperature of an oxygen bomb but not all water baths are so designed as to permit control of the temperature within plus or minus 0.5° C. and that is believed to be the maximum variation that should be permitted because even that variation introduces a possible error of 10 per cent in the results.

The accompanying diagram shows the design of the du Pont oxygen bomb installation. The bombs are machined out of a billet of forged steel, the flange being integral with the body of the bomb. Each bomb is equipped with a pressure gage and with a pure nickel safety disk which will burst if pressure rises above 475 pounds per square inch. There is a thermometer well in each bomb so that the temperature of the inside of the bomb may be determined at any time and compared with the temperature of the water in which the bombs are immersed. It is sometimes found that when very rapidly aging stocks are tested the temperature

inside of the bomb may rise several degrees above that of the water bath.

The bombs are suspended in a water bath which consists of an insulated sheet steel tank of sufficient size to hold three bombs. There are no heating elements in the water bath itself, the water being heated in a separate constant temperature tank in which the water is kept at a constant level by an auxiliary tank which operates on the inverted bottle principle. The hot water is rapidly circulated from the constant temperature tank to the water bath and back to the tank by means of a centrifugal pump. The water in the tank is maintained at 70° C. plus or minus 0.5° C., by means of steam coils, using a vapor filled bulb and a diaphragm valve for controlling the temperature. The control valve is air operated and of the inverted type, being so designed that the steam in the hot water circulating tank is cut off in case the air supply fails. The control air is drawn from the main plant supply but an auxiliary air compressor is used which automatically cuts in with an adequate supply of air whenever the pressure in the main supply line falls below 30 pounds.

The capacity of the individual bombs is approximately 250 cubic inches. The flanged heads are held by means of 12 one inch bolts which are renewed whenever the threads become worn. The samples are placed in the bombs on a spider rack having notched arms which insure accurate spacing of the samples. The maximum number of test pieces aged at any one time is 49. The volume of each test piece is approximately 0.375 cubic inches and the total volume of rubber is therefore never more than 20 cubic inches which is less than 10 per cent of the total volume of the bomb. It is believed that this limit should be strictly adhered to in order to avoid local overheating within the bomb due to the heat that is given off when oxygen combines with rubber.

The bombs are housed in a brick building with doors made of boiler plate. These doors are provided with peek holes so that temperatures and pressure may be observed without entering the building. The oxygen supply tank is located outside of the building in which the bombs are installed and is fitted with a Tagliabue automatic pressure regulator and one-way reducing valve. This controls the oxygen pressure with accuracy and makes it impossible for any explosion that might occur within the bombs during charging, to travel back into the oxygen storage tank. Supply lines leading from the oxygen tank to the bombs are disconnected after the bombs are charged. The safety disks are vented to the outside air by 1-inch brass pipe. It is believed to be unsafe to allow the hot gases that emerge when a safety disk blows to escape into the room in which the oxygen bomb is installed, because of the danger of fire. Iron pipe is unsatisfactory for this purpose because it has been found that the temperature of the gases that issue when a safety disk blows is usually great enough to burn the pipe. Brass is much safer because it is less readily oxidizable than iron. A new lead gasket is used to seal the bomb each time it is loaded. No oil, grease or paint is used on any fitting or part of the bomb equipment.

Six oxygen bombs of the type described above are used by the du Pont rubber laboratory and their safety has been demonstrated by four years operating experience. On numerous occasions safety disks have blown, especially when running aging tests on thin sheets of poor aging rubber such as sulphur chloride cured compounds, but the blowing of a safety disk involves no danger when the above mentioned features of construction are followed.

AGAIN IN 1928, THE SEIBERLING RUBBER CO., AKRON, O., built and sold forty per cent more tires than in 1927. Thus in seven short years this company has jumped from three hundredth to ninth place in the tire industry.

Tire Production Statistics

	High Pressure Pneumatic Casings					
	Cord			Fabric		
	Inventory	Production	Total Shipments	Inventory	Production	Total Shipments
1927	.....	21,527,278	21,733,962	.....	766,581	1,198,549
1928						
January	3,605,064	1,684,750	1,496,047	200,322	56,218	60,404
February	4,394,561	1,697,498	1,244,812	222,655	53,220	28,719
March	4,355,309	1,564,346	1,302,644	235,673	33,168	28,431
April	4,331,499	1,307,759	1,347,854	223,274	16,198	27,523
May	4,152,775	1,404,097	1,570,710	195,886	6,787	36,567
June	3,362,861	1,345,857	1,812,907	171,349	15,107	38,401
July	3,039,349	1,506,228	2,207,086	113,678	9,285	58,434
August	2,465,358	1,903,345	2,416,386	62,132	20,372	71,856
September	2,339,798	1,853,887	1,990,535	48,011	26,931	41,165
October	2,834,193	2,035,898	1,596,081	38,934	15,614	23,426
November	3,197,060*	1,664,024	1,305,186	44,387*	16,541	13,303

	High Pressure Inner Tubes			Balloon Inner Tubes		
	Inventory	Production	Total Shipments	Inventory	Production	Total Shipments
1927	.....	27,398,535	29,528,108	.....	25,718,529	25,143,821
1928						
January	5,328,071	1,669,894	2,014,744	4,408,235	2,411,124	2,539,535
February	5,941,626	1,949,539	1,470,668	5,046,021	3,221,756	2,602,362
March	6,071,983	1,740,238	1,442,162	5,782,551	3,683,017	2,856,342
April	6,044,843	1,628,576	1,459,826	6,434,307	3,365,957	2,815,778
May	6,220,912	1,680,621	1,713,411	7,055,801	3,695,296	3,011,432
June	5,558,455	1,661,897	2,168,337	7,311,204	3,553,191	3,184,056
July	4,435,798	1,764,761	2,970,017	6,794,803	3,240,455	3,576,465
August	3,833,201	2,783,175	3,357,277	6,614,884	3,474,338	3,655,301
September	3,673,789	2,544,561	2,427,444	6,483,804	2,782,759	2,938,309
October	4,525,109	2,469,142	1,881,663	6,938,958	2,727,943	2,365,093
November	4,952,973*	1,929,320	1,512,810	6,867,159*	2,268,410	2,238,347

	Balloon Casings			Solid and Cushion Tires		
	Inventory	Production	Total Shipments	Inventory	Production	Total Shipments
1927	.....	26,037,452	25,111,903	.....	558,030	558,007
1928						
January	3,656,537	2,377,299	2,489,391	161,329	36,279	33,797
February	4,173,493	3,021,548	2,500,013	156,790	36,328	38,715
March	4,700,534	3,516,480	2,967,476	156,424	42,950	44,665
April	4,983,023	3,309,351	2,983,454	154,477	43,255	42,145
May	5,419,093	3,658,349	3,235,236	153,205	46,606	47,604
June	5,587,566	3,658,508	3,486,748	153,925	48,614	48,426
July	5,215,331	3,358,203	3,658,636	150,770	45,792	48,081
August	4,986,800	3,678,139	3,814,016	147,350	51,679	52,334
September	4,935,836	3,220,369	3,327,028	150,500	42,619	43,965
October	5,767,229	3,443,334	2,668,049	153,126	46,590	45,044
November	6,192,556*	2,875,529	2,430,203	150,941*	35,760	37,138

	Cotton and Rubber Consumption Casings, Tubes, Solid and Cushion Tires	
	Cotton Fabric Pounds	Crude Rubber Pounds
1927	177,979,818	463,661,466
1928		
January	16,039,819	43,709,438
February	16,923,607	46,468,050
March	18,853,824	48,897,275
April	18,310,791	43,700,630
May	19,167,606	51,061,030
June	19,646,494	53,158,592
July	20,947,405	47,128,308
August	21,853,756	62,224,046
September	17,796,599	55,351,235
October	20,294,517	58,301,907
November	17,037,313	48,818,977

*As of November 30, 1928.
Rubber Association figures representing 75 per cent of the industry.

Rubber Accelerator Aids Drugs

The value of calcined magnesia as an efficient inorganic accelerator in the reaction of sulphur with rubber, especially in live steam and mold pressure curing, has long been familiar to rubber workers. Not so well known, however, even to many rubber chemists, is the fact that magnesium compounds are also remarkable activators of various organic pharmaceutical preparations, the magnesia seeming to stimulate the active principles of certain high-powered drugs just as it is said in vulcanizing to "effect a response from the natural accelerator in rubber." Some interesting experiments with such organic compounds were recently related by M. L. Crossley, chief chemist of the Calco Chemical Co., in a talk on "Potentiation of Drugs by Magnesium" given at a meeting of the Akron Section of the American Chemical Society.

What Price Selling

The Manufacturers of Rubber Goods Are Floundering Around like a Lost Boat on a Stormy Sea—All Trying to Increase Distribution—Some Trying Out New Methods, and Some with No Method at all

By
C. D. Garretson,
President
Electric Hose
and Rubber Co.
Wilmington
Delaware

IN looking at the cause of this chaotic situation in the rubber industry it must first be acknowledged that there is an over-productive capacity in the rubber business. It seems as if the average rubber manufacturer is too childish to be trusted with this "box of matches," as he is getting burned just as the little child does who plays with them. Also it seems as though manufacturers are trying to outsmart each other, and do not realize that no one in an industry can get and keep any special advantage for himself, but only as he helps his whole industry can he help himself.

In the light of the above our old rubber boat is being buffeted around in the business stream, striking first one rock of price and then another and another. It is only a question of time before it will have a gash in its side which will sink it. There is a limit even to the resiliency of rubber. With the above in mind, would it not be better to stop and face the problem squarely, and logically, and fairly think it through?

Manufacturing is easy, but the selling of rubber products has been made difficult, because of the foolish, thoughtless things that have been done in the policy of merchandising goods.

Some manufacturers sell to anybody who will buy, while others distribute through jobbers only, and still there are others with all varying policies in between. Some manufacturers sell at any price they can get while a very few have a definite price which is never cut, and still others vary their price policy because of whim or circumstance.

Probably the most annoying single factor at this time is the mail order-chain stores. These concerns have obtained from the rubber manufacturers such ridiculously low prices on the rubber products they handle, that they have practically set the retail price on these articles, and have seriously affected the business of not only those who do not sell them, but those manufacturers who do. The mail order competition has steadily driven down the price, on tires for instance, not only to the man who buys them for his private car, but to the original equipment manufacturers whose price was certainly too low before, and the commercial tire users also have saved money at the expense of the tire manufacturers. These rubber manufacturing philanthropists still war on.

And now we hear that one large tire manufacturer is about to open a chain of stores to sell his tires at the same selling price as the mail order-chain stores. He is going to hold his business but at a tremendous expense. This will force other manufacturers to take some similar action. Who is going to pay this enormous selling expense? Eventually, it will be paid by the tire users. The public does not see that yet but when it does—look out.

And it all started by a tire manufacturer making an out of reason, low price to a mail order-chain store. I believe that this manufacturer only saw in the business an increase in his volume or tonnage and did not visualize the aftermath of taking on that particular business. Most of the unfair things we do in business are the result of thoughtlessness.

The same thing in principle is happening in mechanical rubber goods, boots and shoes, clothing, reclaimed rubber and, in fact, throughout the whole rubber line.

That this condition is not good for the rubber goods manufacturers needs no argument, but it is a shame that it should be allowed to continue to the detriment of an industry which is the third largest in the country. This condition is actually affecting the prosperity of our country.

Not long ago—during the late war—I well remember how we, in the rubber industry, talked about patriotism and practiced it, too, under the stress of war. But where is that patriotism now in peace time? It is as much needed now as in war time.

Some of my fellow rubber manufacturers have taken exception to my speeches and articles on business subjects, and have told me that exposing the things that I consider wrong, does not show proper cooperation on my part. My answer to this accusation is that these things are being dragged into the light in the hope that rubber manufacturers will have these silly actions so forcibly brought to their attention, that they will see the uselessness of unprofitable merchandising methods, and will get together with an earnest and trustful desire to really correct them, not only for the common good, but for the good of their customers and country.

Here is hoping for safe and sane merchandising in 1929.

EDITORIALS

How Reclaim May Be Bettered

THE air of aloofness which some compounders still affect toward reclaimed rubber, remarked more abroad than in America, is ridiculous to the practical rubber man. While he, too, might prefer to handle only the choicest raw rubber, he sensibly conforms to commercial conditions and uses all allied materials to the best advantage. He does not disdain regenerated rubber nor expect that the most scientific processing will restore to it the physical properties it originally possessed as raw rubber. Indeed, he is grateful to find that by the steady improvement in reclaiming technique much of it is of such excellent quality that it can largely replace the dearer raw rubber, and that it is neither temperamental in working nor violent in price swing.

Meanwhile two interesting lines of inquiry are being pursued. Along one, researchers are striving to discover the actual mechanization of vulcanization, while along the other efforts are being made to completely undo such union of sulphur and rubber in the hope of restoring the latter perfectly to its primary condition. With the ultimate solution of these problems reclaim will become a more prized adjuvant than ever to natural rubber, and perhaps a formidable rival, because of the enormous and continuous supply of tire and tube scrap annually discarded by motorists which will then become a secondary source of raw rubber.

* * *

Baffling Molecule of Rubber

RECENT researches indicate that the hypothetical double molecule of rubber is very likely a reality, and that it is stable, but such facts apparently can be established only under very favorable conditions. As for ascertaining the weight of the rubber molecule, data so far obtained differs widely, although investigators seem to be nearing the long-sought goal. In recent cryoscopic molecular weight determinations by Pummerer, Nielsen, and Guendel evidence was obtained evidently refuting the contention of Staudinger that the macro- or multiple-molecule of rubber contains from 100 to 1,000 isoprene (C_5H_8) units. The experiments tended to indicate rather a molecule of but 8 isoprene units. The action of ozone, the ultra-violet light absorption values, and the extraordinary tendency toward cyclization are held to strengthen the theory of hydrocarbon ring structure. The lowest molecular weight values found for sol rubber, gel rubber, and diffused rubber were from 520 to 620. Differing powers of aggregation are believed, too, to account for the variance among the rubber fractions. Hydro- and cyclo-rubber also showed a molecular weight around 600. It is curious to compare such molecular weight with those of other organic compounds. Isoprene has 68.06; carbon tetrachloride, 153.83; carbon tetraiodide 519.73; benzene hexabromide, 557.54; cellulose hexanitrate (gun cotton), 594.16; or the blood substance haematin, 695.65.

* * *

Amazonas Keeps Its Rubber Seeds

MUCH conjecture may be indulged in as to the real purpose of the new law (No. 1,387, 1928) enacted by the State of Amazonas, Brazil, prohibiting the exportation of rubber seeds, but doubtless its chief object is self-protection. It has been intimated that the state needs the seeds for reforestation, although some may suspect that they are to be conserved for some large scale cultural project not yet disclosed. Perhaps the statute is designed mainly to protect the native *seringueiros* from outside competition, and by safeguarding a local industry to discourage emigration, for rubber gatherers may soon be in demand not far away.

It is, of course, incredible that Amazonas should be so jealous of the prosperity of any progressive sister state as to refuse to share with it seeds which grow so bountifully in the Valley of the Amazon. Nor may there be any significance in the fact that but little enthusiasm was shown in Amazonas when Henry Ford decided to locate his immense rubber plantation in the adjoining state of Pará. At any rate, the penalties imposed by the new law are severe enough to make even an intrepid trader think twice before attempting to duplicate the famous feat of Sir Henry A. Wickham to benefit either nearby or distant rubber raisers.

* * *

Rubber Producing Cost Drops

THE adage that nothing teaches thrift better than adversity is well exemplified in the economies brought about in the production of crude rubber since it was announced that the restriction prop had been withdrawn. Many British planters have since scaled down output costs so considerably as to assure a good profit despite the present moderate price of rubber; and some companies have evoked queries from stockholders as to why cheaper production had not been effected while the Stevenson Act had upheld the market. One Malayan estate estimates that the 1928 crop will not have cost more than 7 pence per pound. Another reckons its crop at 6 pence, a Sumatra estate management says it is able to produce at 5½ pence; and, on good authority, it is stated that there are some small well-managed plantations that have cut the cost as low as 4½ pence. With crude selling even at little more than 20 cents evidently there is as much profit for some in raising rubber as there is for many others in growing grains or cultivating cotton.

What the Rubber Chemists Are Doing

Rubber as Electrical Insulation[1]

THE most commonly applied test by which the value of an insulating compound is appraised is a determination of the dielectric strength of the material. When a sheet of insulating material is placed between two electrodes and submitted to a rapidly increasing difference of potential, it is found that the difference of potential cannot be increased indefinitely, but that sooner or later, depending upon the thickness of the sheet and certain other factors, chemical and physical changes take place in the body of the insulator and puncture results, after which the current passes unimpeded. The voltage gradient at which this occurs is known as the dielectric strength of the ebonite. It is rather an unfortunate name, and chemists must beware not to confuse it with another value, with which they are much more conversant, namely, the dielectric constant, which has but little connection with dielectric strength. The dielectric strength is better named the breakdown voltage, a term which is self explanatory. The test is far from satisfactory as it gives no indication of what is happening in the insulator prior to the breakdown and, as we shall see later, it is more than probable that in time it will be replaced by more delicate tests of a more discriminating character.

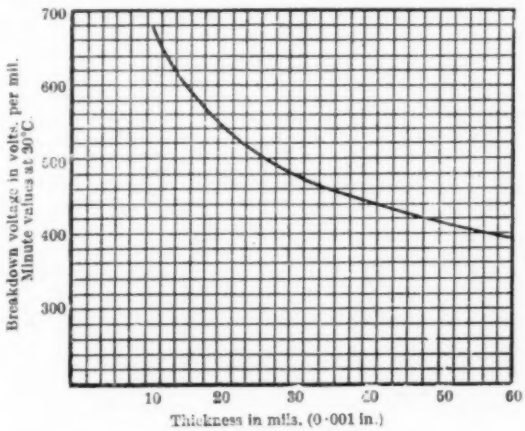


FIG. 1.

Variation of Breakdown Voltage with Thickness of Varnished Cloth

It is also necessary to draw a distinction between dielectric strength (or breakdown voltage) and insulation resistance. Insulation resistance may for our purpose be defined as the actual resistance of an insulator to the passage of a current of electricity. Dielectric strength and insulating resistance are two quite distinct properties of insulating material, and bear no definite relation to each other. Thus, for example, air has a very high insulation resistance, while its dielectric strength is comparatively low. We shall see later that the insulation resistance is largely a measure of the dryness of the insulation, and as such is mainly employed as a preliminary test of the insulation of an assembled plant rather than as a test on any particular type of insulating material.

The first point we have to notice about insulating materials is that doubling the thickness of an insulator does not double its insulating value. This decrease in effective breakdown voltage with increasing thickness of the insulating medium can be followed by reference to Figures, 1, 2 and 3 in which the three curves relate to varnished cloth, hard rubber, and paper miocarta, respectively.

[1] Abstracted from "Electrical Insulating Materials from a Chemical Standpoint." By W. H. Nuttall. Read at a joint meeting of the Glasgow Section with the local Sections of the Institution of the Rubber Industry and the Institute of Chemistry on Nov. 7, 1928.

The breakdown voltages upon which the curves are based are "minute values," that is, they represent the voltage gradient, which produces breakdown, not instantaneously, but after being applied for the duration of 1 minute. The minute value test represents a certain refinement of the ordinary instantaneous test.

In all three curves we have a marked fall in the effective break-

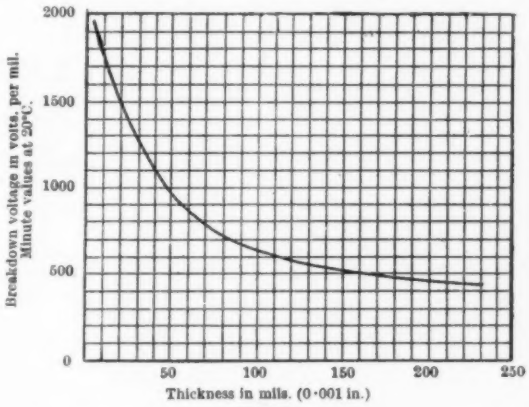


FIG. 2.

Variation of Breakdown Voltage with Thickness of Hard Rubber

down as the thickness increases. Varnished cloth, which possesses a breakdown voltage of about 680 volts per mil. for a thickness of 12 mils., has a breakdown voltage of about two-thirds this value when the thickness reaches 60 mils. Hard rubber with the very high value of approximately 2,000 volts per mil. in a sheet 1 mil. thick, falls to about 450 volts per mil. when the thickness is increased to ¼ in. Paper miocarta tells the same story, and these three insulating materials are typical of all others; there is always falling off in effective breakdown voltage as we increase the thickness of the insulating medium. It is on this account that, when stating the breakdown voltage of various insulating materials, it is necessary to give the thickness of the test piece. This point

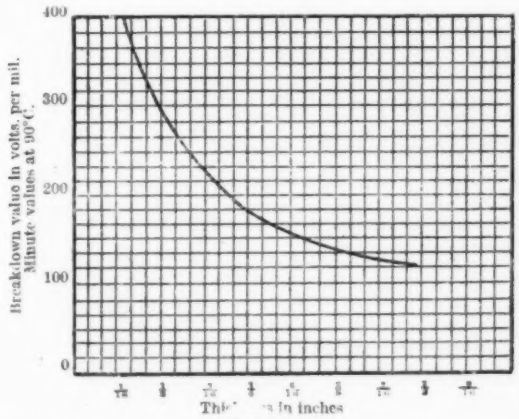


FIG. 3.

Variation of Breakdown Voltage with Thickness of Paper Miocarta

is frequently overlooked with the result that the values quoted are useless for comparison.

Another unfortunate property is that the breakdown voltage of insulating materials decreases markedly as the temperature rises. The difference between the breakdown voltage at 25 and 100° C. is considerable, and this fall in insulating properties as the tempera-

ture rises is characteristic of all insulating materials with the exception of oils, within the range of temperature usually met with in practice.

The "breakdown voltage" test is rapidly falling into disfavor. It is largely an arbitrary test and is affected by a large number of almost extraneous factors, such as thickness, temperature, humidity, time of application of the stress, the rate at which the voltage is stepped up, the shape and nature of the electrodes used, and several other factors not referred to. It will be obvious that the breakdown voltage of an insulator is not an easily defined characteristic, and its value may be badly vitiated by accidental contaminations of an entirely unsuspected nature. Thus, for example, the presence of a film of oil on mica will lower considerably its breakdown voltage. It is not surprising, therefore, that more refined tests are being proposed, such as that described by Everest[2]. In this test the rise in temperature produced within the insulator under standard conditions by a given voltage, or the highest voltage which can be maintained on the insulator without breakdown occurring, is measured.

[2] Electrical Research Asso. Report, A/S. 2.

Effect of Antioxidants on the Color of Rubber Mixes[1]

RESEARCH is directed in the rubber industry today to the problem of the aging of rubber and the means whereby it may be preserved in its initial state for a period of years. As a result many substances have been placed upon the market which secure, when incorporated in the rubber stock, a maintenance of tensile strength, extensibility, and to an extent, resistance to surface cracking. These substances are continually being improved upon and the use of such compounds is rapidly increasing in the rubber industry. The object of research carried out in connection with these substances has been almost entirely the retention of the physical properties of the vulcanized rubber and little attention has been given to the effect of such compounds on the color of rubber stocks where the addition of even a small quantity of antioxidant may have disastrous effects. The production of brightly colored rubber articles, such as toys, is large and important and it is essential that some increased resistance to oxidation changes be provided for such goods, as they are exposed to the effects of air and sunlight in very thin sheets.

The author studied the effect of three different antioxidants on various coloring materials and on white stock and states his conclusions in the following summary:

Summary

The effect of the antioxidants tested is decidedly detrimental to the color of rubber goods. It is due solely to the amine part of the molecule, all three antioxidants tested being of the aldehyde amine type. The effect is equally noticeable on cured and uncured stock and varies according to the amine constituent. The experiments on the latter alone prove paraphenylene diamine the most injurious, and the activity seems to decrease on saturating the compound. Change in color on aging takes place through light acting on or through the amine constituent and is not apparently due to any reaction of the latter with the pigments used in the mixing. The aldehyde amines used as accelerators exert similar discoloring action but no such effect was observed with accelerators of other chemical types.

A condensation product of aniline and acetaldehyde proved the best of the three antioxidants tried from the point of view of color retention, but it must be pointed out that it was the worst with regard to its anti-aging properties as measured by tensile strength, elongation, etc.

It is best to compare the results obtained under the ultra-violet light, as those are strictly comparable whereas those carried out under natural conditions were not obtained at the same time and therefore were exposed to light of varying intensity.

Since this work was begun several new antioxidants have appeared, but they seem to belong to the aldehyde amine class. What is needed appears to be an antioxidant of an altogether different type, or composed of amines with no discoloring tendencies, but it may be that those antioxidants giving good aging properties in the generally accepted meaning of the phrase, are essentially those which cause undesirable discoloration.

[1] *Trans. Inst. Rubber Ind.*, Vol. III, No. 6, April 1928, pp. 419-425.

Antioxidants in Preserving Rubber[1]

DURING the past two or three years several substances have been placed on the market which are designed to be incorporated in rubber compounds to prevent or at least retard deterioration through aging. These substances are designated by the general name of antioxidants. In the case of one or two of these, it has been claimed that it is beneficial to dip rubber articles already vulcanized into solutions of the antioxidants. In order to obtain data on the influence of this dipping process on the aging of rubber articles, tests have been made with five different antioxidants.

Inasmuch as the penetration of antioxidants during the dipping process is probably not very great, the logical products on which to test the effect are thin rubber products, such as surgeons' gloves, rubber bandages, rubber bands, etc. Numerous samples of these articles were dipped in benzol-alcohol solutions of antioxidants for five minutes and then allowed to dry in the air. These were then exposed to aging under two conditions—first, indirect light, such as in an ordinary room; and, second, stored in the dark.

The results of tests of samples exposed to light show that in all cases the antioxidants have had a decidedly beneficial effect. Aging in storage is a much slower process than when rubber is exposed to light, and to date no difference is apparent between dipped and undipped articles.

[1] *Tech. News Bull.*, Bu. of Standards, Washington, D. C., Dec., 1928, No. 140.

Thermax and Flex

Soft carbon as produced by the thermatomic process is now made and marked as two distinct grades. The original one, formerly known as Thermatomic Carbon is now designated as Thermax brand. Its characteristics, value and properties as a compounding ingredient are well known.

The new brand of thermatomic carbon is Flex. Its gravity is about 1.75 the same as any gas black. In color it is distinctly darker than Thermax. It can easily be mixed into rubber in large amounts and acts to quicken rather than retard cure, giving high tensiles, great stretch and low modulus or stiffening effect.

Albasan

Albasan is a new antioxidant offered by the Naugatuck Chemical Co., to meet the demand for a satisfactory antioxidant for light, bright colored and blooming goods. In most cases it can be considered as practically without effect on the color of goods either during the cure or upon exposure to light after the cure. Albasan facilitates the regular factory operations of milling, calendering and tubing.

Rubber manufacturers would probably find no advantage in substituting Albasan in those products in which VGB and other materials are used with complete satisfaction. Albasan was developed and is strongly recommended for use in the large number of places in which no antioxidant has proven satisfactory.

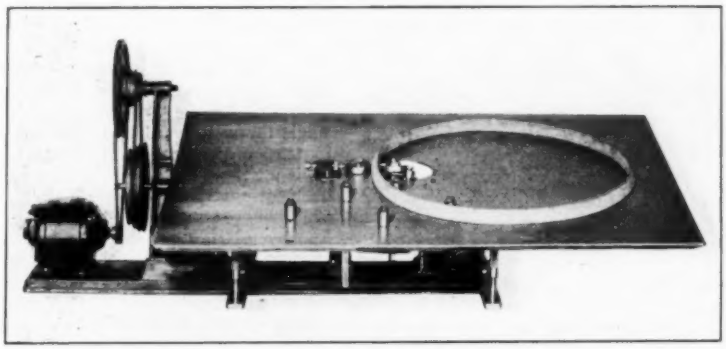
Rubber Division A. C. S.

The spring meeting of the A. C. S., including the Rubber Division, will be held in Columbus, O., the week of April 29. The headquarters of the A. C. S. and also the Rubber Division will be at the Neil House where reservations should be made as early as possible. The Rubber Division meetings will be held in the new chemical laboratory at Ohio State University. The titles at least of all papers to be presented must be in the hands of the secretary not later than March 20. The latest date on which manuscript can be accepted is April 1.

Rubber Chemistry Fellowships

The University of Akron, Akron, O., is receiving applications for The Firestone, Goodyear and Goodrich fellowships in rubber chemistry for 1929-30. These fellowships were established for the encouragement of graduate research in the chemical problems connected with the rubber industry. Each fellowship provides $1,000 for the college year and is open to graduates from chemical courses of approved institutions. The University will exempt the Fellows from the payment of all fees, tuition and breakage. Candidates should file their applications with the Director of the Knight Chemical Laboratory not later than April 1, 1929.

New Machines and Appliances



Morris Inside and Outside Trimmer

Automatic Trimming Machine

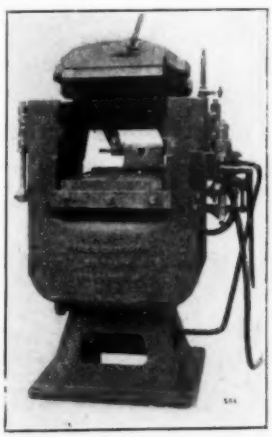
A NEW automatic trimming machine for molded rubber work in large ring shapes, strips, etc., is here pictured trimming the inside of a 36-inch ring. The machine is fully automatic. The horizontal spring roller adjusts against the goods. When properly set the space between this roller and the knives is a little less than the width of the goods to be trimmed. In operation, the goods are placed in this space and the pressure exerted on the spring roller instantly starts the goods revolving or traveling through the machine removing the rind or trim at the same time.

Provision is made for positioning the goods to be trimmed and for their removal with the least effort and without stopping the machine. There are slots in the surface of the table and rollers provided for guiding the goods into the machine. The table can be raised or lowered and an adjustable roller guide at the knives protects the goods from being trimmed too closely. The table is strongly supported and of ample dimensions to receive all sizes, shapes or lengths of goods.—T. W. Morris, 6312 Winthrop Ave., Chicago, Ill.

Hinged Top Vulcanizing Press

THE illustration represents a press that has been extensively adopted in England for the manufacture of talking machine records as well as for vulcanizing rubber products. It is applicable in the manufacture of such goods as hot water bottles and similar flat molded articles for many purposes. The head of the press is locked in position by a bayonet joint and is easily rotated. Being balanced it can be thrown back so that both halves of the mold are fully exposed to the operator.

The steam and water valves are automatically operated by the rising and falling of the ram so that all the operator needs to do is to operate the hydraulic valve, place the material in the press and remove the finished article. The handling in and out of the press of the molds is dispensed with as one half of the mold is secured to the hinged top of the press and the other half to the moving platen.



Shaw's Vulcanizing Press

The simple design and rugged construction embodied in this press will commend it as very practical equipment for rapid molding of small articles.—Francis Shaw & Co., Ltd., Manchester, England.

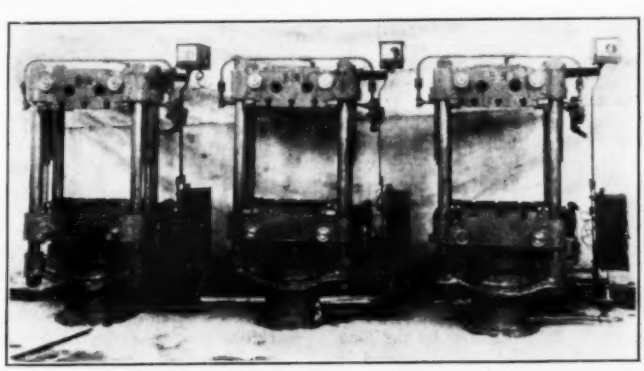
Automatic Control of Vulcanizing Presses

AUTOMATIC time cycle control of hydraulic presses for molding rubber and bakelite insures a more uniform product and more efficient operation than is possible when the time cycle is manually controlled. The control unit pictured applied to a group of three presses consists of a time cycle program contactor, electrically connected to a motor operated control unit, which mechanically operates the valve.

The valve used has three spindles for low pressure, high pressure and exhaust and is of the spring closing type. It is attached to the motor operated controller with suitable brackets and its lever is linked to lever arm of controller so the operating steps are taken in sequence as the timing unit automatically actuates the motor controller.

The compact construction and small floor space required is shown in the illustration. As mounted, the dial of the timing drum is clearly visible to the operator so that he may observe progress of the time cycle and be ready in time with the next mold. The number of completed cycles in a given time is recorded and the total is always visible through the glass front of the timing unit. A manually operated lever arm is used for emergency opening of the press. In bakelite molding this is to permit escape of gases which might otherwise cause a defective article. An electric switch operated by the lever arm automatically opens circuit to the timing drum so that timing of mold under process does not proceed until lever arm is again in normal position.

This equipment is especially developed to handle valves of the two pressure and exhaust type. The first units were installed over three years ago and are still in service although in later models improvements have been incorporated which experience has shown to be desirable.—Automatic Temperature Control Co., Inc., Philadelphia, Pa.

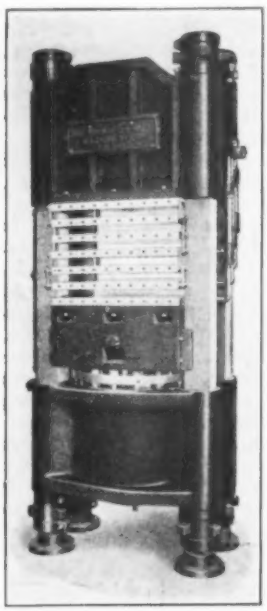


Time Control of Two Pressure Molding Presses

Five Hundred Ton Vulcanizing Press

THE molding of rubber heels is a most particular operation requiring in the press, to produce perfect goods, very rigid construction, high power and accurate parallelism of the platens. These features are provided for in the 6-inch opening steel platen press here pictured, and which was specially designed for heel molding for one of the large rubber companies.

Some unusual features of its design are that it is built with square columns and



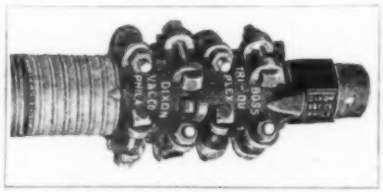
Extra Heavy Heel Press

the bearings are machined cast iron and are not babbitted. The head block is exceptionally deep, heavy and designed to have practically no deflection. The platens are accurately ground and stack within a few thousandths of an inch. The press is especially sturdy throughout and its general accuracy extremely close notwithstanding that its operating capacity is nearly 500 tons.—The French Oil Mill Machinery Co., Piqua, O.

Rotary Hose Coupling

THE highest pumping pressures and exacting conditions of oil well drilling necessitates the use of the most reliable coupling to meet these requirements. The illustration pictures such a coupling the clamp of which comprises 6 pieces with 12 staggered steel bolts giving an evenly distributed and enormous clamping pressure while at the same time allowing the sections to conform exactly with the surface of the hose. The inner surface of the clamp is corrugated to localize pressure over the half oval collars on the stem.

Sufficient take-up is insured by the long dovetailing fingers which are staggered in such a manner that they always overlap and seal the hose at the end. This feature also permits the coupling of hose with a wider range of outside diameters. The same stagger principle distributes the bolt pressure to every point on the circumference of the hose. On hose where wire forms a part of the construction the wire should stop five inches from the end



Dixon Tri-Duplex Hose Coupling

of the hose so that a perfect seal can be accomplished.

It is to effect this seal that this tri-duplex clamp is made with front and back clamps anchored together. By making the clamps not quite as long as either the male or female stems and by recessing in the back end, the compression over the inside end of the stem is greatly relieved. This eliminates any possibility of forcing the hose down over the end of the stem, cutting or crowding the tube of the hose.—Dixon Valve & Coupling Co., Philadelphia, Pa.

Tire Bundling Machine

UNTIL recent years the impression was more or less general that bundling tires with wire would cut into the tires.

Gerrard Tire Bundler

Test shipments, however, proved that this was not so. Examination of wire tied tire bundles that made 9 trips aggregating 6,000 miles before the wires were removed showed just a few indentations where the ties had been and these totally disappeared within two hours. Establishment of this fact resulted in the development of a machine especially adapted for tire banding with a production capacity equal to the needs of tire manufacturing operations.

The wire tied bundle eliminates all possibility of tire pilferage in transit because the splice or tie constitutes an unbreakable seal and a tire cannot be removed from the bundle without cutting the wires. Once cut the wires can never be replaced.

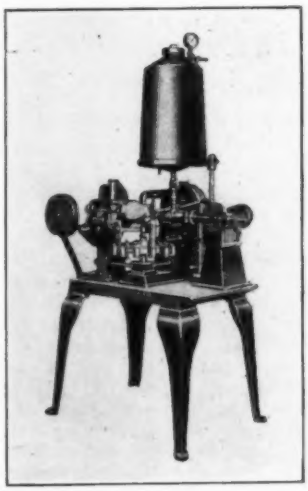
The operation of the wire tying tire bundler is shown in the picture. The papered tires rest on revolving rollers which permit turning the bundle to the next tying point quickly and with slight effort. Operation of the tying head is controlled by the action of one lever, a single throw forward and backward serves to tension, seal and trim the wire. The tie is a twisted splice as strong as the wire itself.—The Gerrard Co., Inc., 1942 South 52nd Ave., Chicago, and 224 Spear St., San Francisco, Calif.

Automatic Rubber Cement Tube Filler

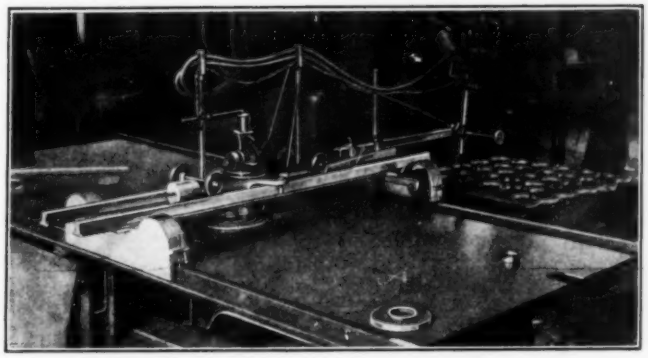
THE increased use of highly volatile rubber solvents and cements put up in collapsible tubes has rendered necessary the most efficient tube filling, closing and clip fastening machinery such as that pictured. It consists of the filling unit, closing unit, and the clipping and ejecting unit. The operator merely sets the empty tube in place and all the subsequent machine operations are automatic including the ejection of the finished filled tube closed with a double fold and securely clipped.

The machine uses a ribbon of clip stock previously embossed and indexed for feeding on the machine. The preforming of this ribbon eliminates the necessity for upkeep of expensive dies for doing this work in the machine itself and also eliminates the cuttings of clip metal which formerly caused considerable trouble in automatic clipping units.

The mechanism is all above the table top making lubrication easy and allowing the operator to be seated at the machine. The machine can be piped direct to a main supply tank dispensing with the auxiliary tank shown in the illustration.—Arthur Colton Co., Detroit, Mich.



Colton Tube Filler



Automatic Machine for Cutting Metal Shapes

Metal Shape Cutting Machine

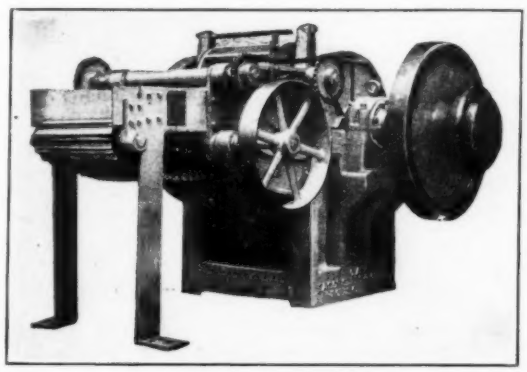
AN automatic oxy-acetylene shape-cutting machine designed to cut patterns and shapes of any sort from steel plate, sheet, forgings, billets or ingots is here pictured. In this machine the cutting blowpipe is mounted on a carriage which is moved in any direction by an electric motor. For routine production it will operate automatically from templets. In cases where only a few parts are to be cut out a hand tracing device can be attached and used to follow the outline of a sketch or blueprint. The parts of the machine are sturdily built without impairing the delicacy of adjustment necessary in a precision instrument of this sort. The rigid construction and unique design prevents lost motion and makes the cutting accurate in every case. The machine requires but one operator. Little machining is necessary in most cases after cutting because the parts are produced with straight corners and smooth faces. The speed of cutting is very high and ranges from 3 to 20 inches per minute, depending on the thickness of the metal. Accurate and smooth cuts can be made in stock up to 1 foot and more in thickness. Production costs are reduced owing to economies in labor, time and material by the use of this apparatus.—The Linde Air Products Co., 30 East 42nd St., New York, N. Y.

Modern Tire Chopper

THE enormous tonnages of heavy tires that constitute the source of scrap for the output of the rubber reclaiming industry require for their reduction into manageable form and size, cutters of adequate strength and durability to cope with any tire that may be met with whether solid or bus pneumatic. Such a machine is illustrated here.

This cutter is practically of all steel construction weighing approximately four tons. It is built to endure the most severe service in cutting pneumatic tires, after debeading. It is directly connected to a motor through a flexible coupling and is a very compact unit. The cutter is equipped with roller bearings which increase very greatly the efficiency of the machine.

A few details typical of the size, construction, capacity and power of the machine may be noted as follows: The floor space required is 75 by 78 inches; the frame is a single steel casting; the knife cylinder is cast steel carrying four 17-inch knives; feed of steel apron type; with 3-inch breaking down shaft and 14-inch roller. The driving speed is 700 r.p.m.; 30 to 40 horse power; cutting capacity 4 to 5 tons per hour.—Taylor, Stiles & Co., Riegelsville, N. J.

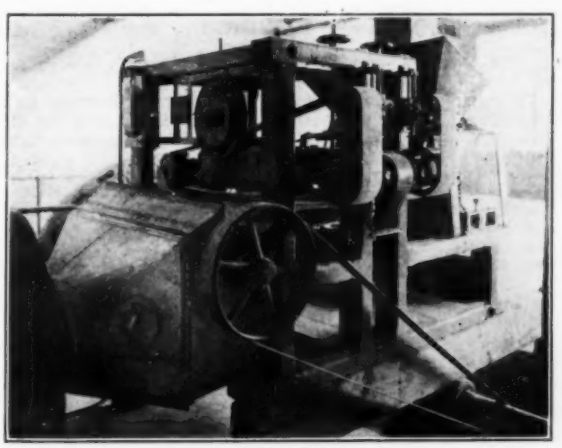


"Giant" Tire Chopper

Magnetic Separator

THE reclaiming branch of the rubber industry is dependent on the use of some form of separator for eliminating metals from ground scrap rubber. For the removal of magnetic material a magnetic separator is positively a necessity. The latest devolopment of this sort of machine is of the high intensity type. That is to say, its design permits of any desired magnetic intensity so that where mechanically free fine iron is to be extracted, a machine of rather nominal intensity is used, but where extremely fine bits of iron are to be picked out, or where the small particles of iron are attached to non-magnetic particles, a machine of this type of higher intensity must be applied. Two standard windings have been adopted each for the specific problems to which it applies.

In the operation of the type B crossbelt machine here illustrated, the material is fed upon the main conveyer belt which carries it in a uniformly distributed layer between two magnetic poles which make up the first magnetic zone. It then passes through a similar set of poles forming the second magnetic zone. The magnetic gaps are always held at a maximum distance to promote good separation and this circumstance makes possible the application of heavy and rugged cross belt conveyers for taking away the separated material.—Dings Magnetic Separator Co., Milwaukee, Wis.



Dings Type B Magnetic Separator

Graphite Joint Seal

IN the erecting and repair departments of rubber factories no less than in those of most other industrial plants there is need for a permanently reliable joint seal, particularly for joints in air, water and steam lines.

An entirely new and improved type of graphic sealing paste has been perfected which displaces ordinary red lead for screw thread, flange and gasket joints. It is not soluble in oils, gasoline, etc., and can be applied with equally excellent results to corrugated metal, asbestos fiber, composition, rubber and emergency gaskets of paper or wire gauze. It has a broad usefulness in diverse fields.

Graphite seal is high heat resisting, hardens quickly as an inert mass in cold or moderate temperatures. It expands instead of shrinking when subjected to the higher temperatures and remains permanently expanded. It keeps without spoilage and for use requires only to be suitably thinned with water. For pipe joints thin to the consistency of thick paint and apply with a brush. For gasket joints thin just enough to allow spreading and apply to both sides of the gasket.—Joseph Dixon Crucible Co., Jersey City, N. J.

Editor's Book Table

Book Reviews

"Industrial Carbon." By C. L. Mantell, D. Van Nostrand Co., Inc., 8 Warren St., New York, N. Y. Cloth, pages 5½ by 8¾. Illustrated, indexed.

This volume is one of the series of "Industrial Chemical Monographs" edited by W. Lee Lewis, Ph.D., and Harrison E. Howe. They are classed as "foundational books on specialized subjects." The present volume affords the reader much interesting, historical and technical data concerning the numerous forms and industrial uses of carbon. The various varieties, forms and industrial applications of carbon are covered in 29 chapters in which details of the latest practice are presented. The chapters on carbon black and graphite are of special interest to rubber compounders and technologists. The final chapter of the volume comprises a comprehensive tabulation for reference purposes of the physical and chemical characteristics of carbon with references to the authorities for the data.

"Rubber Producing Companies with List of Directors and Secretaries." Compiled by the Mincing Lane Tea & Rubber Share Brokers' Association, Ltd., London, Nov., 1928.

This annual reference publication contains a brief review of the development of the crude rubber producing industry for the past few years with tabulations of the planted areas of the principal countries, their present and future potential output. The data listed for the several hundred tea and rubber plantations include their directors, executives, capital, production, etc. The volume forms a reliable directory for commercial reference.

"Investigations at the Imperial Institute on Samples of Plantation Para Rubber from Ceylon. Bulletin No. 49." Columbo, Ceylon, H. Ross Cottle, Government Printer, 1928.

This pamphlet of 9 pages is a report on the "Causes of Variation in Plasticity" prepared in connection with the rubber research scheme at Peradeniya, Ceylon. In connection with the experiments reported it is pointed out that none of the methods employed in the determination of plasticity gives results which bear a known relation to a strictly defined physical property.

"Tractive Resistance of Automobiles and Coefficients of Friction of Pneumatic Tires." By T. R. Agg. Engineering Experiment Station, Iowa State College, Ames, Iowa. Paper, 60 pages, 6 by 9 inches. Illustrations and graphs.

This is a report of a highway investigation conducted by the Iowa Engineering Experiment Station in cooperation with the United States Bureau of Public Roads. A summary of the more significant results of the investigation of tractive resistance is given.

"Encyclopedie du Caoutchouc et des Industries qui s'y Rattachent." Edited by the Syndicat du Caoutchouc et des Industries qui s'y Rattachent. Published by *La Revue Generale du Caoutchouc*, 18 Rue Duphot, Paris, 1929. Stiff covers, 500 pages, 7¼ by 10¾ inches, tables, graphs, illustrations.

Not since 1896 has a really comprehensive work on the rubber industry been published in France. To be sure, various useful manuals have recently appeared, but the need was felt by the Association of Rubber and Allied Industries for a work that would gather together the sum total of present knowledge on rubber. With this in view, cooperation of the best qualified French experts was secured, with what good results the present imposing volume bears ample testimony.

The four parts into which the subject matter has been divided cover the production of crude rubber, vulcanized rubber, the various manufactures, and scientific and technical research. Under the guidance of such men as Girard, Hauser, Bary, Sloim, Boiry, Macré, Gazel. Audy, Bregeat, to name some of the contributors, the reader learns about crude rubber, reclaims, fillers, pigments, accelerators, antioxidants, and is finally initiated into the processes of producing a number of rubber articles. The part devoted to manufacture closes with a chapter on different methods and appliances for the recovery of solvents, also dipping equipment.

As to the volume itself, it is handsomely gotten up and well illustrated by a number of photographs.

New Publications

"Farrel-Sykes Roller Bearing Type Speed Reducers From 1 to 5,000 Horse Power." This catalog of 24 pages issued by Farrel-Birmingham Co., Inc., Ansonia, Conn., illustrates and describes new types of power reduction units. It is in effect a most instructive monograph on the efficiency of the Sykes gear with power data and illustrations showing it in speed reducer drives for machine tool and industrial power applications.

"Engineering Achievements," special publication 1717-C, has been released by the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa. The publication is profusely illustrated with examples of the trend of the electrical industry, all developed by Westinghouse engineers.

"Glossary of Rubber Products Exported from United States, 1929," special circular No. 2,200, prepared by the Rubber Division of the Department of Commerce, Bureau of Foreign and Domestic Commerce. This glossary is for use by exporters of rubber products when making out shippers' export declarations.

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PRESERVING LATEX WITH BORAX.—N. Beumée-Nieuwland, *Arch. Rubbercultuur*, 12 pp. 441-52 (1928). (Summarized in English, p. 453).

CHEMICAL ANALYSIS APPLIED TO THE SELECTION OF HEVEA.—A. W. K. DE LONG, *Arch. Rubbercultuur*, pp. 472-501 (1928). (Summarized in English, pp. 502-3).

EXTRACTION OF GUTTA PERCHA LEAF.—A. W. K. DE LONG, *Arch. Rubbercultuur*, 12 pp. 540-55 (1928). (Summarized in English, pp. 556-7).

SODIUM FLUOSILICATE IN THE PRODUCTION OF RUBBER.—N. H. VAN HARPEN, *Arch. Rubbercultuur*, 12, pp. 423-31 (1928). (In English, pp. 432-40).

IMPORTANT OBSERVATIONS ON RUBBER MIXTURES CONTAINING GAS AND LAMP BLACKS.—Werner Esch, *Gummi-Zeit.*, 43, pp. 75-8 (1928).

THE ABSORPTION OF LIGHT BY STRETCHED AND BY UNSTRETCHED RUBBER AND BY ISOPRENE.—M. Kröger and H. Staude, *Gummi-Zeit.*, 43, pp. 22, 24 (1928).

STANDARD METHODS OF ANALYSIS OF RUBBER GOODS.—A. E. Leighton, Australia Dept. of Defense Munitions Supply Board, May, 1926, 11 pp.

THE MANUFACTURE OF HARD RUBBER DUST.—Max Rathke, *Gummi-Zeit.*, 42, pp. 2688-9 (1928).

SOME EXPERIMENTS ON THE MANUFACTURE OF RUBBER ROAD BLOCKS.—J. G. Fol and F. C. van Heurn, *Bull. Rubber Growers' Assoc.*, 10, pp. 608-20 (1928).

RUBBER SOLVENTS, VARNISHES AND COATINGS.—R. Assman, *Farbe u. Lack*, 1928, pp. 411, 426-7.

THE QUESTION OF PRIORITY FOR THE DISCOVERY OF THERMOPLASTIC PRODUCTS FROM RUBBER, WHICH RESEMBLE GUTTA PERCHA, BALATA AND SHELLAC, AND THEIR SYSTEMATIZATION.—F. Kirchof, *Kaut.*, 4, pp. 142-9 (1928).

THE VULCANIZATION OF RUBBER WITH METALLIC SULPHIDES AND AN ULTRA-ACCELERATOR.—Takeji Yamazaki, *J. Soc. Chem. Ind., Japan*, 31, p. 165 B (1928).

SINGLE TEXTURE PROOFING.—E. P. Rydings, *Trans. Inst. Rubber Industry*, 4, pp. 161-9 (1928).

RECENT AND COMING DEVELOPMENTS IN MECHANICS FOR TESTING FIBERS YARNS AND FABRICS.—David Scott, *Textile World*, 74, pp. 2623-7 (1928).

RUBBER PROOFING OF FABRICS.—A. M. Munro, *Textile J. Australia*, 3, pp. 96-8, 162-4 (1928).

DETERMINATION OF TOTAL SOLIDS OF CERTAIN LIQUIDS (LATEX).—H. H. Krause, *Chemist-Analyst*, 17, No. 4, p. 14 (1928).

SUPPLEMENTARY OBSERVATIONS ON FOSSIL RUBBER BARK IN ANCIENT BROWN COAL.—W. Gothan, *Centr. Min. Geol.*, 1927 A. pp. 209-11; *Chem. Zentr.*, 1927, II p. 800.

ELECTRIC CONDUCTION IN HARD RUBBER, PYREX AND FUSED CRYSTALLINE QUARTZ.—Hubert H. Race, *J. Am. Inst. Elec. Eng.*, 47, pp. 788-91 (1928).

Greetings, Calendars and Souvenirs

The Damascus Mfg. Corp., Cleveland, O., sent a combination desk memo pad and calendar at the front of which is an alphabetical arrangement for the names and telephone numbers of frequent phone calls. The calendar is well bound with ample space for memorandum.

The Akron Standard Mold Co., Akron, O., forwarded a large calendar in red, white and blue, at the top of each month, in smaller type, is given the month preceding and the month succeeding the current month.

A similar calendar to the above was received from T. C. Ashley & Co., 683 Atlantic Ave., Boston, Mass.

From The Naugatuck Chemical Co., Naugatuck, Conn., came a desk calendar and pad artistically developed in brown and white. Metal legs hold it up at one end, a convenient arrangement for writing.

A smaller loose leaf calendar in red and white came to us from the American Zinc Sales Co., Columbus, O. These are to be attached to a back provided by the company a previous year.

Blue, white, red and black is the color combination chosen by The Rubber Service Laboratories Co., Akron, O. The current month, on a white background, occupies the center of the page with the preceding and following months above and beneath it on a blue background.

The Hartol Products Corp., 117 Liberty St., New York, N. Y., sent a large calendar, each page containing three months.

The calendar of E. H. Clapp Rubber Products Co., Boston, Mass., is an exquisite little water color of a thatched cottage around which flowers of every variety riot and is entitled "Home Sweet Home."

The Aluminum Flake Co., Akron, O., forwarded a beautiful water color calendar of a lovely young girl to which the title "Sweetheart" is given. The picture is mounted on a green and gold background.

A large beautifully colored Indian's head is the main feature of the calendar from the Pequanoc Rubber Co., Butler, N. J. The background is very artistically arranged in varying shades of gold, brown and green.

A quaint scene in an English village, Twilight Peace, tops the calendar of John Robertson Co., Inc., Brooklyn, N. Y.

The Oak Rubber Co., Ravenna, O., remembered us with a dainty little calendar of red and black upon which a nymph is holding an assortment of gaily colored balloons.

Vansul, Inc., New York, N. Y., has utilized the space at the top of its calendar with a representation of a map of Greater New York and its environments.

John Royle & Sons, Paterson, N. J., provided a pocket memorandum book which contains information and maps of value.

The Akron Equipment Co., Akron, O., forwarded a slide caliper rule, a handy and useful device.

The remembrance from the Vultex Corp. of America, Cambridge, Mass., was a beautiful bunch of rubber roses in shades of red, pink and yellow.

Rivers, Lakes and Mountains is the title given to the booklet containing the calendar of the United Shoe Machinery Corp., Boston, Mass. Illustrations, maps and descriptions of the three subjects are given and the booklet is mounted on a stand.

The Garlock Packing Co., Palmyra, N. Y., sent a large wall calendar. The current month, in the center of the page, is in heavy type while the preceding and following months are in lighter type.

Cards containing appropriate Christmas and New Year greetings were received from the following: Goodyear Tire & Rubber Co., Akron, O.; Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont., Canada; The Landers Corp., Toledo, O.; Vansul, Inc., New York, N. Y.; The Akron Standard Mold Co., Akron, O.; The Cleveland Liner & Mfg. Co., Cleveland, O.; Hartol Products Corp., New York, N. Y.; The New Jersey Zinc Sales Co., New York, N. Y.; R. R. Olin Laboratories, Akron, O.; H. Hentz & Co., New York, N. Y.; Frederick J. Maywald, Belleville, N. J.; Mitsui & Co., Ltd., New York, N. Y.; and The Hoggson & Pettis Mfg. Co., New Haven, Conn.

New Incorporations

EASTERN BEC CORP., Jan. 10 (New York), capital stock 100 shares no par value. C. E. Bonner, 250 West 57 St., J. R. Bonner, 270 Seaman Ave., and M. B. Farquharson, 250 West 57 St., all of New York, N. Y. Principal office, Manhattan. To manufacture auto tires, etc.

HOWE TIRE & RUBBER CORP., Dec. 28 (New York), capital stock 200 shares no par value. H. Woog, E. Ismack and M. Katz, all of 150 Broadway, New York, N. Y. Principal office, Kings County, N. Y. Articles made of rubber.

MANDLEBERG, LTD., Jan. 10 (New York), $200,000. A. M. Burns, E. J. Mellet and J. Lynch, all of 120 Broadway, New York, N. Y. Principal office, Manhattan. To manufacture raincoats, etc.

NIELSEN-PIERCE, INC., Jan. 9 (New York), capital stock 200 shares no par value. H. P. and C. B. Pierce, 785 Auburn Ave., and C. C. Strot, 176 Eaton St., all of Buffalo, N. Y. Principal office, Buffalo, N. Y. To manufacture tires and rubber goods.

STERLING RAINCOAT CO., INC., Jan. 11 (New York), $10,000. J. Rosenfeld, E. Goldberg and J. Buitenkant, all of 225 West 34 St., New York, N. Y. Principal office, Manhattan. To manufacture raincoats, etc.

The B. F. Goodrich Co.

The directors of The B. F. Goodrich Co. after the regular quarterly meeting held Jan. 23, 1929, issued the following statement:

Consolidated net sales of the company for the fiscal year ended Dec. 31, 1928, were approximately $148,250,000. The net income for the last six months of the year after adequate depreciation of properties and provision for federal income taxes was slightly in excess of $5,000,000. Deducting the loss for the first six months leaves a net income for the year of approximately $3,500,000, without recourse to reserves previously created. All inventories were taken at the lower of cost or market.

Dividends on the preferred stock were declared as follows: $1.75 per share payable Apr. 1, 1929, to stockholders of record on Mar. 8, 1929, and $1.75 per share payable July 1, 1929, to holders of record June 10, 1929. Also a dividend of $1.00 per share was declared payable on Mar. 1, 1929, on the common stock without nominal or par value to holders of record on Feb. 8, 1929. The directors approved the retirement of 11,880 shares of preferred stock in accordance with the provisions of the charter.

Samson Tire & Rubber Corp.

Samson Tire & Rubber Corp., Los Angeles, Calif., is offering through a local banking group an issue of $1,000,000 ten-year 6½ per cent convertible sinking fund gold debentures, the proceeds to be used chiefly as additional working capital and to finance the building of the new factory. This is the first funded debt of the company. Under the refinancing plan par value of the common stock has been raised from $5 to $10 and 100,000 shares issued to stockholders of the 200,000 shares of old stock. About 25,000 shares of additional stock may be offered by the syndicate. Samson sales for the eleven months ended Nov. 30 last were $7,605,410.55, as compared with $6,588,075.88 for the entire year of 1927. Net earnings for the five preceding months were stated to be equal to 8.31 times the maximum annual interest charges on the pending debentures.

Legal

ACCELERATOR PHENYL-ORTHO-TOLYL-GUANIDINE. In Albert C. Burrage et al. vs. Roessler & Hasslacher Chemical Co., District Court for the District of New Jersey, claims 3 and 7 of patent No. 1,697,233 for an accelerator in the vulcanization of rubber were held too broad and too general to admit of validity. The opinion states that the patentee made no disclosure as to the quality of "P.O.T.G." to be used or how it is to be used or how it produces any new or useful result.

Rubber Trade Inquiries

The inquiries that follow have already been answered; nevertheles they are of interest not only in showing the needs of the trade, but because of the possibility that additional information may be furnished by those who read them. The Editor is therefore glad to have those interested communicate with him.

NUMBER	INQUIRY
1192	Trade mark for heels consisting of three numerals.
1193	Manufacture of granular vacuum glass.
1194	Cement which joins rubber and leather, resisting oil, water and heat.
1195	Rubber molds for making plaster paris objects.
1196	Manufacturers of rubber toys and dolls.
1197	Interval timer for vulcanizers.
1198	Machine for varnishing gaiters and rubbers.
1199	Rubber tubing free from sulphur.
1200	Inlaid rubber mats.
1201	Instruments for measuring surface heats on rubber rolls.

Foreign Trade Information

For further information concerning the inquiries listed below address United States Department of Commerce, Bureau of Foreign and Domestic Commerce, Room 734, Custom House, New York, N. Y.

NUMBER	COMMODITY	CITY AND COUNTRY	PURCHASE OR AGENCY
35,162	Garden hose	Amersfoort, Netherlands	Purchase
35,163	Waist belts and parts for garters	Warsaw, Poland	Both
35,164	Friction tape	Stratford, Canada	Purchase
35,165	Sheeting, mackintosh and surgical goods	Bombay, India	Purchase
35,166	Tires and tubes	Patras, Greece	Both
35,268	Druggists' sundries	Paris, France	Either
35,269	Tires	Basel, Switzerland	Both
35,270	Boots	Lyon, France	Purchase
35,308	Druggists' sundries, bath and laboratory accessories, and shoes	Montevideo, Uruguay	Both
35,383	Raincoat fabric	Berlin, Germany	Agency
35,384	Thread for elastic fabric	St. Etienne, France	Agency
35,385	Shoes and tennis balls	Milan, Italy	Purchase
35,387	Boots and shoes	Oslo, Norway	Agency
35,392	Golf balls	Paris, France	Either
35,395	Bands and erasers	Madrid, Spain	Agency
35,443	Tires	Vienna, Austria	Agency
35,476	Overshoes, shoes and heels	Montevideo, Uruguay	Both
35,478	Tires and tubes	Cawnpore, India	Both
35,479	Balloons	Milan, Italy	Purchase
35,495	Bathing caps, shoes and belts	Rome, Italy	Purchase
35,587	Bathing caps, sponges, shoes and balloons	Hamburg, Germany	Either
35,588	Tires	Vienna, Austria	Agency
35,589	Druggists' sundries, specialties, tires and toys	Berlin, Germany	Agency
35,600	Boots, shoes, canvas shoes, toys, sporting goods and specialties	Rome, Italy	Agency
35,623	Bathing caps	Berlin, Germany	Agency
35,625	Druggists' sundries, rain coats and tires	Jaffa, Palestine	Agency
35,628	Tires	Tel Aviv, Palestine	Agency
35,714	Tires	Rome, Italy	Both
35,736	Mechanical goods	Milan, Italy	Agency
35,763	Belts and shoes	Baghdad, Iraq	Agency
35,764	Galoshes	Constantinople, Turkey	Agency
35,765	Tires	Salonica, Greece	Agency
35,766	Automobile cloth	Rotterdam, Netherlands	Agency
35,767	Footwear with metal slide fasteners	Weimar, Germany	Agency
35,768	Tires	Hong Kong, China	Agency
35,772	Golf, tennis and canvas shoes	Zurich, Switzerland	Agency
35,775	Aprons, caps, gloves, balloons, etc.	Rosario, Argentina	Both

Dividends Declared

COMPANY	Stock	Rate	Payable	Stock of Record
Akron R. R.	Pfd.	$0.50 s. a.	Jan. 15	.....
Dunlop T. & R. Goods	7% Pfd.	$1.75 q.	.....	.....
Electric H. & R.	Pfd.	1½% q.	Jan. 15	.....
Electric H. & R.	Pfd.	½% ex.	Jan. 15	.....
Firestone	Com.	2% q.	Feb. 15	Feb. 1
Firestone	Pfd.	1¾% q.	Feb. 15	Feb. 1
General	Com.	$1.00 q.	Feb. 1	Jan. 21
General	Com.	4% q.	Feb. 1	Jan. 21
General	Com.	8% ex.	Jan. 10	Nov. 20
General	Com.	$2.00 ex.	Jan. 2	Dec. 10
Goodrich	Com.	$1.00 q.	Mar. 1	Feb. 8
Goodrich	Pfd.	$1.75 q.	Apr. 1	Mar. 8
Hood	7½% Pfd.	$1.87 q.	Feb. 1	Jan. 21
Hood	7% Pfd.	$1.75 q.	Feb. 1	Jan. 21
Hood	Pfd.	1¾% q.	Mar. 1	Feb. 20
Manhattan	Com.	$0.75 q.	Jan. 31	Jan. 15
Rubber Service	Com.	$0.60 q.	Jan. 20	Jan. 10
Stedman Products	Pfd.	1.75 q.	Jan. 2	Dec. 26

New Goods and Specialties

Sport Ball

The Ball-O-Fun is hand made of tough, resilient, wearproof rubber, vulcanized to

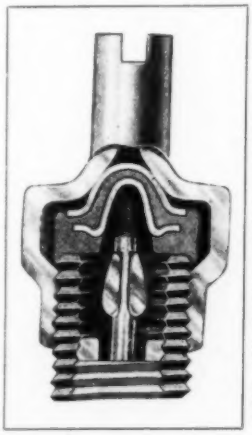
Ball-O-Fun

make it strong and durable. It comes in four sizes, 10, 14, 17 and 24 inches in diameter. The ball is resilient, an ordinary bounce throws it fifteen feet into the air.

A patented valve eliminates the necessity of tying to keep inflated. The process of inflation is simple. Push the thumb or forefinger of one hand under flap which holds the air valve and raise the flap until valve stands upright and free from pressure at its junction with the ball. Blow through valve, or attach air pump, holding the flap back continuously until the ball is distended to its full size, if used in games or exercises requiring solidity. If used for arm or chest exercises, fill with just enough air to allow flexibility. When ball is sufficiently inflated, fold tube or valve once in middle, placing end of tube at its outside base, thereby forming the letter U. Stretch valve cover back. Push the bent valve tightly under the flap.—Rubber Products Corp., Grand Rapids, Mich.

Improved Tire Valve Cap

The familiar old style tire valve cap containing a simple flat washer was effective for excluding road dust from access to the inside of the valve which was the chief intention of its design. Now, however, it has been redesigned and perfected to accomplish the added function of retaining intact the full air pressure in the tire in the emergency of leakage past the valve mechanism.



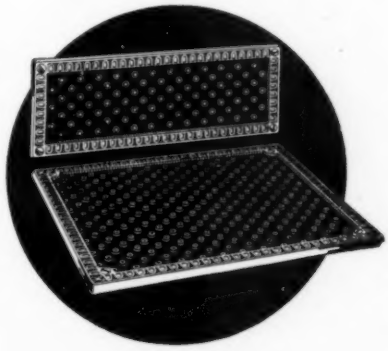
Schrader Valve Cap

The accompanying part sectional view of a straight valve cap represents the internal feature of the new type. The flat washer is replaced by a molded rubber gasket of special form, the upper part of which is stiffened and supported by a metallic plate insert which prevents the rubber from collapsing inwardly and depressing the valve inside the plunger. Molded over the top of the washer is a metal pivot plate which protects the rubber and prevents it from turning and becoming distorted.

An outer metal shell covers and swivels around the rubber washer as the cap is being applied to the valve. The reinforced washer seals the mouth of the valve when the cap is screwed down tight by hand.—A. Schrader's Son, Inc., Brooklyn, N. Y.

Running Board Plate

No possible chance to slip when stepping into the car in rainy or inclement weather, according to the manufacturer, when the



Slip-Not

running board is supplied with the Slip-Not vacuum cup plate. Countless small vacuum cups firmly grip the soles of the shoes, holding securely, at the same time scraping all snow and mud from the feet and keeping the interior of the car dirt free. The plates are designed to properly fit all new model cars and are furnished either with or without the foot scraper.

The pattern and design of the aluminum frame is artistically constructed and the mat is of heavy fine quality jet black rubber covered with small suction cups.—F. Edelmann & Co., 2332-56 Logan Blvd., Chicago, Ill.

Cavalier Tire

The B. F. Goodrich Co., Akron, O., is offering a new Cavalier tire which is a standard tire of high quality with exceptional wearing characteristics. It is being offered as a dependable and economic means of transportation.

Soft Rubber Vase

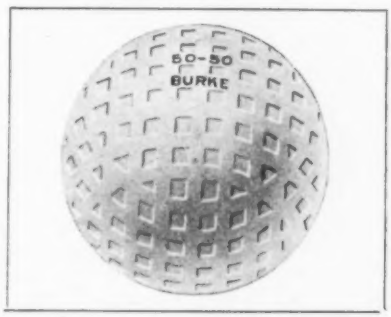
An attractive item has recently been marketed by the Davol Rubber Co., Providence, R. I., a soft rubber flower vase. It is made of marbleized stock and is ten inches high and four and a half inches at base and top. For general home use it should quickly become a favorite as it is a decorative article, non-breakable and furthermore will not scratch or mar polished surfaces. It is also adaptable for use in drug stores, hospitals, schools and public buildings or anywhere that glass tops are in use. It will last indefinitely, so that its first cost of two dollars is also the final cost.

Flower Vase

New Golf Ball

The 50-50 Burke is a fifty cent golf ball which is guaranteed to finish 50 holes without cutting, cracking or losing its shape. If it should fail before the half hundred mark is passed, it may be returned.

The core is a sphere of pure, live rubber perfectly balanced to assure true performance on fairway and putting green. The first winding is hand work. One inch para tape is stretched to eight times its normal length wound evenly and hard around the soft rubber center. Para thread is used for the second winding. Thirty yards of this rubber is stretched nine times its normal length and wound under this maximum tension. Smaller para thread is used in the final winding. When the completed core has passed inspection it is placed in bleached cover cups. These are vulcanized with great care to assure the right degree of hardness. When it comes from the mold, the ball is trimmed and finished, tested for resiliency and hardness, inspected for imperfections and finally painted.—The Burke Golf Co., Newark, O.



Rubber Tee

Perfect Tee

This invention relates to an improvement in golf ball tees, having for its object a means of support for the ball at a uniform height and in a position available to be struck without interference from or by the tee. Because of its flexibility the tee offers no resistance to the club as it meets the ball, and so will not destroy the stroke or resist the proper movement of the ball therefrom after being struck.

The tee is placed by inserting a nail pin in the base, placing the tee on the tee-off and pushing the nail into terrain with the nail to the fore, thus acting as a hinge. This leaves the tee setting flat on the ground and obviates the annoyance of having the ball roll off. A string and weight attachment is also offered in place of the nail if the golfer wishes. The tee sets on the ground the same as with the nail, but with the string and weight attachment thrown on the ground to the fore. A convenient use of this attachment is to drop the weight into the bag, with the tee hanging outside, and carry the same as a club. —Perfect Golf Tee Co., New London, Wis.

Triple-A Balloon Tire

Announcement has been made by the Corduroy Tire Co., Grand Rapids, Mich., of its new extra size tire known as the Triple-A balloon. It is said to be sturdier, heavier and larger than standard tires, yet not too heavy or too large to be used in place of standard tires when extra long mileage, safety and riding comfort are of first consideration. It is manufactured in all popular balloon sizes.

Punching Bag Outfit

The Rub-A-Cup silent platform fits all regulation bags and can be adjusted for uppercutting. It occupies only four inches of wall space, is easily set up and may be dismounted in a jiffy. It is actually silent because of the patented Rub-A-Cup, which makes it appropriate for any home or apartment. The bag punching teaches boxing, besides being one of the most healthful exercises.—Moosehead-Whitely Exerciser Co., 1139 Tiffany St., New York, N. Y.

Rub-A-Cup Platform

Dotted Golf Ball

A new golf ball, known as the Multicolor, is being introduced to players by A. G. Spalding & Bros., 105 Nassau St., New York, N. Y. The ball is supplied with all red dots, or a combination of red, blue and green dots on a white background, the dots, it is claimed, making the ball appear larger and easier to find after a drive.

Drain Pump

When drain pipes become clogged and greasy and the sink is half filled with dirty water which will not run out, a handy little device is the hydraulic drain pump shown in the illustration. A force pump attached to a short length of hose utilizes the force of the water and soon cleans and clears the pipe and allows the water to flow through freely.—Albert G. Burns, 1924 Broadway, Oakland, Calif.

Hydraulic Drain Pump

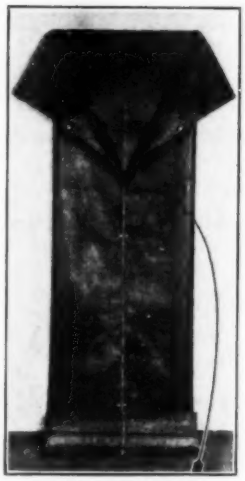
Registered Tire

To meet the demand for larger, more rugged tires that will stand up under faster runs and harder braking the Kelly-Springfield Tire Co., 1775 Broadway, New York, N. Y., has brought out a new registered balloon tire. Oversized throughout, with nearly ten per cent more air capacity than the corresponding standard size balloon, with a tread twice as thick and extending much further down the sidewalls, and with two extra plies in the 7-inch size.

A card is attached to the flap of each tire. The purchaser will fill out this card with his name and address, the make and model of his car, the date and the serial number of the tire and return it to the Kelly factory, which will thus be enabled to keep in touch with him until such time as he is satisfied that his tire has given him the mileage he expected.

Morticians' Zipper Blanket

A new type of rubber blanket for undertakers' use is the "Neversoil Protecto," 4½x9 feet, and having a "zipper" or hookless fastener to unite the sides and thus inclose a body. Additional protection from leakage is afforded by folding over the ends and securing them with snap fasteners. The blanket is intended to not only replace the old-time rubber sheet, but to also serve as an emergency cot, basket, or stretcher, especially in tight places; and, with the patient's head partly uncovered, it may be used for ambulance cases, especially in inclement weather. It serves, too, as a rainproof casket cover and a floor rug for embalmers, easily sterilized.—California Rubber Products Co., 257 S. Spring St., Los Angeles, Calif.



Zipper Blanket

Pipe with Rubber Joints

An invention by a French engineer of a rubber joint for reinforced concrete pipes has successfully withstood many tests. When inserted between lengths of pipes, it is compressed so that water pressure tends to tighten it against the walls of the pipe making it watertight. Pipe laying is facilitated as one length of pipe may be pushed into the end of the other with the rubber joint interposed. The outside of the joint may be filled.

Mat for the Bath

Slipping in the bath tub has been the cause of many serious accidents which may now be avoided by the use of the Safe-Bath mat. It is equally handy for the shower, and was designed to be used by the adult, child and invalid. Vacuum cups hold the mat securely in place after it has been drawn tight and the cups pressed down firmly. The manufacturer is the Safe Bath Co., 4924 Sheridan Rd., Chicago, Ill.

The Rubber Industry in America

Rubber Division A. C. S. Akron Group Meeting

The Akron Rubber Group of the American Chemical Society held its fourth meeting and dinner in the main dining-room of the Goodyear Tire & Rubber Co., Monday evening, Jan. 28. Dinner was served at 6:30 P. M. to approximately 400 members. After the dinner, the meeting adjourned to the Goodyear Theatre where the annual election of officers for the ensuing year was held. The following were elected: Chairman, G. K. Kinshaw, Goodyear Tire & Rubber Co.; vice chairman, K. O. Smith, The B. F. Goodrich Co.; secretary-treasurer, C. W. Sanderson, Goodyear Tire & Rubber Co. These will replace the following retiring officers: H. A. Winkelman, chairman; W. H. Fleming, vice chairman and R. J. Bonstein, secretary-treasurer.

After the business of the evening had been transacted, a symposium on the measurement of rubber thickness was presented.

E. O. Dietrich of The B. F. Goodrich Co. read the first paper of the evening on the subject, "Some Practical Methods of Gaging Thickness at Calenders." This paper was quite practical and described some of the methods used at the present time for the measurement and control of rubber sheets of varying thickness. A thickness of .001 inch above required gage on a 54-inch calender may amount to a loss of $380,000 per year.

The second paper was presented by R. W. Brown of the Firestone Tire & Rubber Co. on "Essentials for Gaging of Compressible Materials." This was a very interesting discussion and presented a survey of the instruments used for measuring thickness, also the magnitude of the errors which may be expected.

R. D. Evans of the Goodyear Tire & Rubber Co. gave the final paper on, "Some Causes of Variability of Gage and Unit Weight of Calendered Products." Temperature variation in compound and speed of calender rolls cause variation in gage. This paper also was of a practical nature and was of great importance, especially to a calender foreman or inspector.

Ohio

The Goodyear Tire & Rubber Co., Akron, O., has appointed R. S. Burdette, formerly of the manufacturers sales department, manager of the newly organized rim sales department. L. T. Beck, also formerly of the manufacturers sales department, has been included in the personnel of the new department.

J. E. Mayl, formerly manager of truck tire sales for Goodyear, has been appointed manager of its southern division. He succeeds C. W. Martin, Jr., who has been given a leave of absence. E. R. Preston, formerly assistant manager of truck tire sales, will succeed Mayl as manager of the truck tire department with K. A. Dalsky assistant manager.

The Barr Rubber Products Co., Sandusky, O., started production in its new plant Jan. 21, 1929. The company manufactures toy balloons and rubber balls.

P. W. Litchfield, president of the Goodyear Tire & Rubber Co., Akron, O., was presented with a ten-year veteran scout badge in recognition of his ten years' registered service with the Akron Area Council, Boy Scouts of America.

Harriss & Vose, 177 S. Main St., Akron, O., boasts of the only ground floor brokerage house in Akron. Here direct wire service is offered on New York Cotton and Rubber Exchange orders, and about 500 N. Y. Exchange stocks are boarded. A unique feature is a stock board code by which any stock can be located quickly. H. H. Henderson is manager of the Akron branch.

P. W. Leavitt, historian of The B. F. Goodrich Rubber Co., Akron, O., completed in December his forty-eighth year in the employ of the company. Mr. Leavitt probably holds the distinction of being the oldest employee, in point of service, in the rubber industry.

Paul W. Litchfield, president of the Goodyear Tire & Rubber Co., Akron, O., stated in an address at the Kiwanis Club, that a few years ago, no money could be raised for aeronautics but within the last six months, more than $50,000,000 has been raised. He predicted a very prosperous year for all rubber companies, especially for the first six months of the year. He also stated that he expected a normal increase of about 20,000 tires per day in local production.

A. C. Davidson of the comptroller's department of the Goodyear Tire & Rubber Co., and **A. H. Zieske,** construction engineer with the same company, have been assigned posts at the new Goodyear plant at Gadsden, Ala.

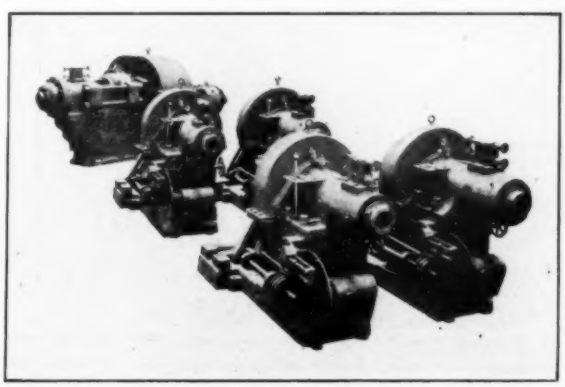
Elmer Clark, master mechanic with the Goodyear Tire & Rubber Co. has been appointed plant superintendent of the Goodyear-Zeppelin Corp. He will superintend the construction of the super-dirigibles which the corporation will build for the navy at the Akron municipal airport. M. P. Uhrich has been named as acting master mechanic. Men are now being trained in the Goodyear plant for work on the construction of the dirigibles which will be started as soon as the hangar is completed early in June.

Colonel Charles Lindbergh is expected to visit Akron to discuss the proposed Akron Aviation School, for which an expenditure of $100,000 will be required. It will be one of the most complete schools in the country and its plans have attracted nation wide interest in aviation circles.

The American Bridge Co., Pittsburgh, Pa., and the **Clemmer-Noah Construction Co.,** Akron, O., have been awarded contracts for the erection of the huge hangar at the Akron mnunicipal airport. Approximately 6,500 tons of steel will go into the framework of the hangar, the largest building in the world when it is completed.

The Philadelphia Rubber Works Co., Akron, O., held its annual meeting Jan. 21 when the following officers were elected: J. Kearsley Mitchell, chairman of the board; J. S. Lowman, president; R. S. Rauch, first vice president; H. G. Day, second vice president; F. J. Sullivan, secretary and treasurer; H. W. Chaudoin, assistant secretary and treasurer. The company reports that its business for the year 1928 was the largest in its history.

David Leslie Brown has resigned from his connection with the Goodyear Tire & Rubber Co. Before his resignation he was manager of the European division of the Goodyear Export Co.



Tubing machines designed by the Adamson Machine Co., Akron, O., to meet special operating conditions in foreign countries where repairs must be kept to the extreme minimum.

The Sun Rubber Co., Barberton, O., will devote an entire new department to the design and manufacture of special molded rubber goods of intricate design. William German, who has been associated for fourteen years with the Goodyear Tire & Rubber Co., will have charge of the new department.

Sam S. Poor, formerly sales manager of the New York branch of the General Tire & Rubber Co., has been made general sales manager of the company with headquarters in Akron, O.

The Mohawk Rubber Co., Akron, O., has constructed a new building for the housing of a new, large ultra-modern experimental laboratory. Also new machinery has been installed in the factory which increases production approximately 500 tires per day.

General Earns Two Million

Net sales of the General Tire & Rubber Co., Akron, O., during 1928 amounted to $26,100,000 with a net profit of over $2,000,000 or $18.40 a share. Gross earnings for the year amounted to $24.20 a share before the absorption of a $1,000,000 inventory loss due to lower prices. An extra cash dividend of 8 per cent was authorized together with the regular common dividend of 16 per cent. During 1928, the company retired $139,900 of preferred stock which is about twice the preferred contract requirement for the year.

Officers and directors elected at the annual meeting were: William O'Neil, president; W. E. Fouse and Charles J. Jahant, vice presidents; T. F. O'Neil, secretary; J. B. Stoller, assistant secretary and Charles Herberich, treasurer. Other directors are G. F. Burkhardt, J. A. Diebold and R. W. Gallegher.

Goodyear's Safety Progress

Goodyear has reason to be proud of its safety record for the past year. A reduction of 33.9 per cent for the first ten months of the year over a corresponding period of 1927, with October leading with a 73 per cent record better than the same month last year.

Miller's Druggists' Sundries Convention

Salesmen and branch managers of the Miller Rubber Co., Akron, O., representing the druggists' sundries division from all parts of the United States, convened in Akron, January 2, 3, 4, 5, for its annual conference. Addresses were made by W. F. Pfeiffer, vice president; L. C. Rockhill, sales manager; and R. T. Griffiths, factory superintendent. Several salesmen, known as the Ten Minute Men, also made brief talks.

Sales and merchandising plans for 1929 were discussed and it was announced that 1928 sales were the best in the history of the company's druggists' sundry line.

Mason Plants Sold

The plants of the Mason Tire & Rubber Co., Kent, O., were purchased by bondholders for $600,000. F. M. Brooke of Philadelphia represented the bondholders. Inventories and stock were sold for $119,500 to the General Parts Corp., Flint, Mich., and Winternitz & Co. of Chicago. It is expected that operations will be resumed at the plants by March 1.

Scrap Rubber Rating

According to the Traffic Bulletin of the National Association of Waste Material Dealers, Inc., it is proposed to reduce carload rating in Western classification territory, on scrap rubber and tires, from Class C to Class D, but it is also proposed to increase the minimum weight in all territories from 30,000 to 40,000 pounds.

All Ohio Safety Organization

The Rubber Section of The All Ohio Safety Organization elected the following men for the coming year: Chairman, Jack Kidney, Goodyear Tire & Rubber Co.; vice chairman, P. M. Wooden, The Mansfield Tire & Rubber Co.; secretary, Howard W. Low, The Miller Rubber Co.

Midwest

The Cutler-Hammer Mfg. Co., Milwaukee, Wis., has changed its name to Cutler-Hammer, Inc. The new company is organized as a Delaware corporation and unites under one name the Cutler-Hammer Mfg. Co., Milwaukee, The Cream City Foundry Co., Milwaukee, and the Cutler-Hammer Mfg. Co., New York.

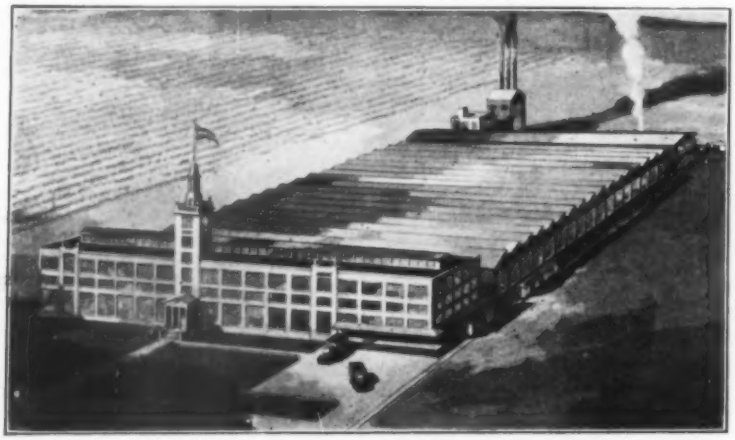
The Watson-Stillman Co., 75 West St., New York, N. Y., manufacturer of hydraulic machinery, has appointed the Midvale Mining & Mfg. Co. its representative in the St. Louis district. The Midvale company has its main office at 705 Olive St., St. Louis, and its warehouse at East St. Louis, Ill.

Gilbert K. Trimble, formerly with the Seiberling Rubber Co., has been made chief chemist of the Midwest Rubber Reclaiming Co., East St. Louis, Ill.

E. L. Fries, vice president, secretary and treasurer of the Ajax Rubber Co., Racine, Wis., has resigned to join a firm of New York investment brokers Ralph A. Beavey has succeeded Mr. Fries as treasurer and W. E. Williams has been made assistant treasurer. Charles Collins, of Charlotte, N. C., was elected to Fries' place on the board of directors.

Akron Section A. C. S.

The Akron Section of the American Chemical Society met Jan. 9, 1929, at the Firestone Club House. About fifty members attended and listened to a paper on "Chain Reactions and Their Inhibition" by Dr. H. N. Alyea. The mechanism of antioxidant action has been the subject of several years of research by Dr. Alyea. He has been associated with Prof. H. S. Taylor at Princeton and with Prof. Hans L. J. Bäckström at both Nobel Institute, Stockholm, Sweden, and at Princeton and is continuing the same line of work this year at the University of Minnesota with Prof. S. C. Lind.



View of the new Goodyear factory at Gadsden, Ala., as it will look when completed. The building site covers an area of 400 acres. The building will eventually have a frontage of 400 feet, and be 800 feet deep and four stories high. It will have an initial capacity of 5,000 tires a day and will employ 1,800 people. Construction of the plant and installation of machinery, it is expected, may be completed by midsummer.

Rhode Island

Part time schedules which have prevailed at several of the rubber manufacturing establishments in Rhode Island during the last two or three months are to be continued, or in some instances further curtailed according to reports received incidental to the conclusion of business for the first month of the new year. The shortage of highly skilled artisans in these lines has been greatly emphasized as many of this class have sought employment in other places or in other lines. Rhode Island's rubber factories are large producers of footwear, and the unfavorable weather conditions have been detrimental to active business so that large surplus stocks remain in the hands of retailers and jobbers. This unseasonable weather is responsible for the four-day week schedule which went into effect at the Woonsocket and Millville plants of the Woonsocket Rubber Co., on Jan. 4. This company is one of the subsidiaries of the United States Rubber Co., and employs about 1,700 persons.

The General Assembly of Rhode Island has introduced a bill which would make Armistice Day (Nov. 11) a legal holiday. Another bill would prohibit employers from deducting from the wages of an employe, on account of coming late, a sum in excess of the proportionate wage which would have been earned during the time actually lost.

The New England Rubber Co.'s assignee's report has been allowed by Presiding Justice Willard B. Tanner in the Superior Court and a decree confirming the same and discharging the assignee has been entered.

Charles J. Davol, president of the Davol Rubber Co., has been selected as one of a group of five Rhode Island business leaders as a campaign committee to assist in raising a fund of $1,750,000 to be used by the National Association of Credit Men to battle "commercial crimes" and fraudulent business methods. Henry D. Sharpe, president of the Brown & Sharpe Mfg. Co., and Samuel M. Nicholson, president of the Nicholson File Co., are two other local members.

Matthew Capone has been elected chairman of the Factory Council of the National India Rubber Co., Bristol, with the following as the other officers: Vice Chairman, Raymond Cavallaro; chairman of Ked's production committee, Saverio Rinaldi; chairman of Ked's working conditions committee, Raymond Cavallero; chairman of wire production and working conditions committee, Joseph Enos; chairman of general service committee, Charles Dunbar.

National India Rubber Co., Bristol, has been handicapped since early in January by the absence from work of large numbers of its employes affected by the epidemic of colds and influenza. On one day there were more than 300 employes on the sick list.

Daniel Dwyer has been elected chief of the fire brigade of the National India Rubber Co. at Bristol. John Grabert, chief of the Bristol Fire Department, has been chosen as instructor of the company and will also act in an advisory capacity and a fire commissioner will be elected at the next meeting of the fire company.

New England

The Converse Rubber Shoe Co., Pearl St., Malden, Mass., was sold at auction on Jan. 9th for $1,292,833.17 to Mitchell B. Kaufman, president of the Archer Strauss Rubber Co., of New York, N. Y., and the Hodgman Rubber Co., Framingham, Mass. The sale, made by order of the court, carried with it the liabilities of the company from the time it went into receivership. The receiver was Morton L. Patterson of Boston and the company was purchased for the Converse Holding Co. Mark Levine, auctioneer of Boston, made the sale.

James S. Halahan, formerly southern representative of the United States Rubber Co., at Baltimore, Md., has been made manager of the clothing department of the Clifton Mfg. Co., manufacturer of rubber goods, at Jamaica Plain, Boston, Mass.

Harry L. Bunting, formerly department manager of the Clifton Mfg. Co., Jamaica Plain, Boston, Mass., has resigned.

The Archer Strauss Rubber Co., Framingham, Mass., has changed its name to the Hodgman Rubber Co. The change does not affect the corporate structure of the company in any way, and all liabilities and contracts are now assumed by the Hodgman company.

Vultex Corp. of America, Kendall Bldg., Cambridge, Mass., is a subsidiary of Vultex, Ltd., the British company which owns the Schidrowitz and other patents relating to processes of vulcanizing latex without coagulation. J. B. Crockett represents the American company.

N. W. Spear, Cambridge Rubber Co., Cambridge, Mass., is on a business trip in Chicago.

James R. Caldwell, factory manager of The Seamless Rubber Co., New Haven, Conn., has been spending a few weeks in Florida.

Boston Shoe Show

The Boston Shoe Show for 1929 held at the Hotel Statler for three days, Jan. 2, 3, and 4, was considered one of the best that has ever been held locally both from orders taken and size of exhibits. Rubber merchants were well represented in the list of exhibitors and they all reported much interest shown in their displays. Among these exhibitors were: The Auburn Rubber Corp., Auburn, Ind., showing a full line of rubber mats and rubber carpets for shoe stores, also rubber soles and heels; The Balloon Rubber Heel Co., Brockton, Mass., sport soles and heels; Cambridge Rubber Co., Cambridge, Mass., showing a line of rubber and canvas footwear; Essex Rubber Co., Trenton, N. J., heels, soles, composition soles and rubber specialties; B. F. Goodrich Rubber Co., Akron, O., gymnasium shoes and footwear; Lennox Shoe Co., Lynn, Mass., sport footwear; Panco Rubber Co., Chelsea, Mass., composition and rubber soles and heels; Philips-Baker Rubber Co., Providence, R. I., rubber and canvas footwear; Seiberling Rubber Co., Akron, O., slipper soling and uppers, Bearfoot soles and rubber heels.

Goodyear Plant Reorganized

The reorganized Goodyear Rubber Co., Middletown, Conn., has reopened its plant to begin the job of preparing it for production. Harold S. Guy has been elected president of the company; Daniel E. Gray and Arthur V. McDowell, vice presidents; Charles M. Park, treasurer; and Philip E. Reilley, secretary and assistant treasurer. The board further voted that Vice President Gray be sales manager and Vice President McDowell be production manager.

Clifford S. Bartlett, for many years in charge of The B. F. Goodrich Co.'s tire depot at New Haven, Conn., has resigned to accept a position elsewhere.

Lloyd L. Libby, formerly with The Portland Rubber Co., Portland, Me., Canadian Rubber Co., Montreal, and The B. F. Goodrich Rubber Co., New York, is now connected with The Seamless Rubber Co., New Haven, Conn.

The Sponge Rubber Products Co., formerly of New Haven, is now located on Housatonic Ave., Derby, Conn.

The Gordon Packing & Supply Co., through its president, Joseph Gordon, reports good business on hose and packing. This company handles the Republic Rubber Co.'s mechanical goods.

The Norfolk Tire & Rubber Co., Norfolk, Conn., announces the appointment of the Samuel C. Croot Co., Inc., New York, N. Y., advertising and sales councilors, to handle its advertising for the coming year.

The C. S. Mersick Co., New Haven, Conn., was awarded the contract by the City of New Haven, for 6,000 feet of fire hose. The Mersick company has been agent for The New York Belting & Packing Co. for many years.

Eastern and Southern

Harriss & Vose is the new name of the firm formerly doing business under the name of Harriss, Irby & Vose. Offices of the company are located in the New York Cotton Exchange Bldg., New York, N. Y.

The Rubber Trade Association of New York, Inc., is now located at 14 William St., New York, N. Y.

M. H. Tisne, manager of manufacturers' accessories sales for A. Schrader's Son, Inc., 470 Vanderbilt Ave., Brooklyn, N. Y., has been elected president of the Cycle Trades of America, Inc.

George E. Pell has resigned as vice president of the Lavino American & Asiatic Co., Bullitt Bldg., Philadelphia, Pa. The management of the rubber department will be continued under Frank C. Foley, 110 East 42nd St., New York, N. Y.

P. A. Murphy, 15 Moore St., New York, N. Y., is the firm name chosen by P. A. Murphy and George E. Pell who have associated themselves as brokers in crude rubber and other tropical products.

Goldsmith Astor Rubber Co., has moved to 17-21 East 22nd St., New York, N. Y.

The Motor & Equipment Association, 250 W. 57th St., New York, N. Y., has planned for 1929 aggressive work in sales development, credit interchange and cooperation with other organizations in promotion of motor transportation and the automotive trade. The work will be carried on under the general direction of M. L. Heminway, managing director, with B. W. Ruark as his assistant.

E. M. & F. Waldo, Inc., Muirkirk, Md., has changed its headquarters in New York from 244 Fifth Ave., to 11 Broadway.

The Twelfth Exposition of the Chemical Industries will be held May 6 to 11 at Grand Central Palace, New York, N. Y. This exposition will bring together chemists, engineers and manufacturers from over forty industries.

Dr. Harry L. Fisher of the United States Rubber Co. will present a paper on chemistry and rubber at Cooper Union, New York, N. Y., on Feb. 26, 1929.

Lake Erie Engineering Corp., Buffalo, N. Y., designer and builder of hydraulic and plate working machinery, announces the addition of W. B. Kochenderfer to its engineering staff. Formerly connected with the Birdsboro Steel Foundry & Machine Co. and Southwark Foundry & Machine Co., he will continue to specialize in the design of hydraulic presses used in the rubber industry.

John Hadfield is now vice president and general manager of the Old Dominion Rubber Co., Norfolk, Va., manufacturers of toy balloons.

The Georgia Pine Turpentine Co. has appointed Wishnick-Tumpeer, Inc., New York, N. Y., exclusive sales agent for the Piney Woods brand of pine tar and pine tar oil. The New York office of the Georgia company has been discontinued and all sales matters will be handled through the Wishnick-Tumpeer offices.

A. M. Oliver, for six years in the advertising department of The Goodyear Tire & Rubber Co., Akron, O., specializing on mechanical rubber goods and sole and heel advertising, has resigned to become advertising manager of The Pangborn Corp., Hagerstown, Md., manufacturer of sand blast and dust collecting machinery.

Frank A. Steele, of Goodyear-California, has been appointed superintendent of the Goodyear factory at Gadsden, Ala. Mr. Steele has been associated with the Goodyear company for eighteen years.

Camachine Gives Twenty Years' Service

A record performance for a slitting and roll winding machine has been reported by the Cameron Machine Co., 61 Poplar St., Brooklyn, N. Y. A Camachine purchased twenty years ago by Anthony Eisler & Co. of New York City is still in use and gives promise of some additional years of efficient and economical service.

U. S. Rubber Company Changes in Personnel

At a meeting of the board of directors of the United States Rubber Co., held January 15, Francis Breese Davis, Jr., was elected a director, member of the executive committee, chairman of the board of directors and president of the United States Rubber Co. Mr. Davis is a director of E. I. duPont de Nemours & Co., also president and general manager of the duPont Viscoloid Co. At the same meeting the resignation of Charles B. Seger as chairman of the board of directors and president of the company, was accepted. Mr. Seger will continue as a member of the board of directors and executive committee.

Other changes in executive personnel are: L. D. Tompkins, formerly president of the General Rubber Co., is now first vice president of the U. S. company in charge of tire activities; H. Gordon Smith, formerly assistant to the president, becomes second vice president and assistant to Mr. Tompkins. W. F. Earls has been made general manager of advertising.

John Donaldson was elected vice president of the General Rubber Co. and will conduct operations of the company at New York.

New President of the United States Rubber Co.

An event of great interest in the rubber industry occurred Jan. 15, 1929, when Francis Breese Davis, Jr., was elected a director, member of the executive committee, chairman of the board of directors and president of the United States Rubber Co. Mr. Davis is a director of E. I. du-

Underwood & Underwood

F. B. Davis, Jr.

Pont de Nemours & Co., and president and general manager of the duPont Viscoloid Co. He has had a business career embracing a wide range of endeavor.

Mr. Davis was born Sept. 16, 1883, graduated from Yale in civil engineering in 1906. The next year was spent in engineering work in New England, later joining the maintenance of way and construction department of the Pennsylvania Railroad.

In 1909 he first became identified with the duPont company as resident engineer in charge of plant construction at Belin, Pa. During the years intervening between then and the World War he was active in operating work in connection with the black powder department at Wilmington, Del., and later as resident engineer at Hopewell, Va., had charge of the construction of the greatest gun cotton plant in the world.

He was successively a plant superintendent and assistant manager at the Carney's Point works, assistant works manager at the Old Hickory powder plant near Nashville, Tenn., until the Armistice closed the operation of the plant.

After his sales salvaging work of surplus plants and products for the duPont company Mr. Davis was identified, Nov. 1921, with General Motors Corp. as assistant general manager of the Saginaw Products Division, manufacturing pyroxylin plastic material. Aug. 1, 1923, he became general manager of the department. Apr. 1925, the Celastic Corp. was organized with Mr. Davis as president. A month later the duPont pyralin department and the Viscoloid Co. of Leominster, Mass., consolidated as the duPont Viscoloid Co., under the presidency of Mr. Davis, who is also chairman of the directors of the Pittsburgh Safety Glass Co., jointly owned by the Pittsburgh Plate Glass Co., and the duPont Viscoloid Co.

John Young with R. S. L.

John Young has been made Eastern representative of The Rubber Service Laboratories Co., Akron, O. He will call on the trade in that territory and at the same time will do some special investigation work.

Mr. Young is well known in the rubber business. He was first connected with a rubber plantation in South America, and then in the research laboratory of the Diamond Rubber Co., Akron, O. He afterwards became chief chemist of The Firestone Tire & Rubber Co., which connection he severed to become manager of the Intermediates Division of The National Aniline & Chemical Co.

Bachrach

John Young

The Rubber Service Laboratories Co. has been manufacturing organic chemicals for the rubber industry for a number of years and has recently branched out with a number of other lines.

Rubber Association Heel and Sole Division

The Heel and Sole Division of the Rubber Association met at the New York Athletic Club on Jan. 15. Chairman Herbert A. Derry, of the United States Rubber Co., presided and sixteen representatives attended.

A subcommittee reported on publicity given to the recently adopted standard warranty on black and tan composition soles through trade paper advertising and it was decided to mail reprints of this advertising to a large list of retailers, shoe manufacturers and jobbers.

Closer cooperation between production departments and sales departments, it was generally agreed, would reduce excessive inventory stocks.

It is expected that the next meeting of the division will be held about Apr. 1, probably in New York.

Schrader on the Air

A. Schrader's Son, Inc., Brooklyn, N. Y., will broadcast over the National Broadcasting Co.'s red network of twenty stations every Friday evening throughout 1929. Arthur B. Allen and Louis Mason will tell their adventures with the mythical Schradertown garage between selections by the Schradertown brass band.

New Jersey

All divisions of the New Jersey rubber industry are showing signs of increased production. With the presidential year over and the completion of inventories the manufacturers are looking for more settled conditions. Factories are now busy on fire and garden hose for spring delivery. Hard rubber production also shows a little increase while the manufacture of rubber heels and soles continues to be normal.

The Rubber Manufacturers' Association of New Jersey held its annual meeting in December at the Trenton Club, Trenton, N. J. and reelected A. Boyd Cornell, secretary of the Hamilton Rubber Mfg. Co., as president; Charles E. Stokes, Jr., of the Home Rubber Co., was reelected secretary; I. Ely Reed, secretary of the Mercer Rubber Co. became the new vice president, while Horace B. Tobin, president of the Woven Steel Hose & Rubber Co., was elected treasurer. Following the meeting a banquet was served and talks on the trade given by different members.

Robert J. Stokes, president of the Thermoid Rubber Co., Trenton, N. J., has been chosen a director of the Broad Street National Bank of which his father, William J. B. Stokes, of the Thermoid company, is also a director.

Horace B. Tobin, president of the Woven Steel Hose & Rubber Co., Trenton, N. J., has been elected a director of the Trenton Banking Co.

The Luzerne Rubber Co., Trenton, N. J., reports some improvement in the hard rubber business during the past month.

Lambert and Raritan Merger

Announcement has been made of the consolidation of the Lambert Tire & Rubber Co. with the Raritan Rubber, Inc., New Brunswick, N. J. Activities of the Raritan company will be transferred to the Barberton plant, and the New Brunswick plant will be closed down.

The common capital stock of the Lambert company has been increased to the extent of $200,000 and the preferred stock to $128,000. As a final step in carrying out the consolidation and reorganization, a reorganization committee filed a petition for the appointment of a receiver to wind up the affairs of the Lambert Tire & Rubber Co., an Arizona corporation which is the present owner of the property.

The officers of the Lambert company are: G. W. Seiberling, president; J. P. Seiberling, vice president and treasurer; J. W. Dessecker, secretary and assistant treasurer. J. P. Seiberling is in charge of sales and has announced that Alfred Foster, president of Raritan Rubber, Inc., is to join the new company as manager of truck tire sales.

Frederick J. Maywald, F. C. S., is now located at 301 Hoboken Rd., corner of 10th St., Carlstadt, N. J.

The St. Mungo Mfg. Co. of America, 121 Sylvan Ave., Newark, N. J., is enlarging its factory so that the floor space is doubled, thus enabling the company to increase its output of Colonel golf balls.

The Manhattan Rubber Mfg. Co., Passaic, N. J., distributed a bonus to all of its employes on Dec. 20, 1928. The amount was 2 per cent of the yearly salary.

The Firestone Tire & Rubber Co., Akron, O., has purchased the property at Central Ave. and Fourth St., Newark, N. J., which measures 130 by 90 feet. The company will raze the structure and erect a modern four-story building to be used exclusively by the Firestone company as its main New Jersey sales and distributing station. The second, third and four stories will be used for storage and warehouse purposes. The ground floor of 22,500 feet of space will be for the retail distribution of its products. The company will make an appeal to women drivers and provide a reading and rest rooms for them. Executives believe Newark possesses greater possibilities for Firestone tires.

The Puritan Rubber Co., Trenton, N. J., plans to erect a three-story building which will add 10,000 feet of floor space to the present plant. The company has ordered new equipment and is operating twenty-two hours a day on Amtico rubber tiling and mats.

The Thermoid Rubber Co., Trenton, N. J., states that business has improved considerably since the first of the new year. The company's orders for various products have increased.

Art H. Massey, general sales manager of the Combination Rubber Co., Trenton, N. J., spent a week visiting the company's branches in the West and Midwest. The company continues to operate with three shifts.

The Joseph Stokes Rubber Co., Trenton, N. J., hard rubber manufacturer, announces that business for the coming half year looks more promising than during the past six months. New machinery and other equipment is being installed to increase production.

Whitehead Bros. Rubber Co., Trenton, N. J., reports that business is gradually increasing and that the plant is operating to normal capacity on spring orders for molded fire and garden hose.

Boston Rubber Traffic

Imports of rubber through the port of Boston in 1928 totaled 15,969 tons, or more than any other port with the exception of New York. A few years ago Boston handled practically no rubber and the present increase is credited to the cooperation of the Rubber Association.

Pacific Coast

Pacific Goodrich Rubber Co. opened its new office and warehouse in the wholesale district on Brannan St., between Second and Third, San Francisco, Calif., on Jan. 14. The new establishment has facilities for the handling of a huge quantity of products, including tires, belting, footwear, druggists' sundries, etc., from the Akron and Los Angeles factories. The building, which has a private railroad spur, is laid out as a hollow square and has all the storing and distributing provisions of the most up-to-date warehouse. F. S. Harkins is in charge. The expansion program of the factory in Los Angeles is steadily progressing, new machinery is being installed, and daily tire production is close to 5,000. General Sales Manager Frank E. Titus, Branch Administration Manager J. L. Kelly, and Jay S. Smith, pneumatic tire sales manager, between Jan. 8 and 22 visited the Phoenix, Salt Lake, Seattle, Portland, San Francisco, and other branches and found good progress being made at all points in the Pacific Coast territory. J. M. Fisher, air container tube specialist, from the parent Goodrich plant in Akron, was a recent visitor at the Los Angeles works. James A. Calway has been transferred from the medical sales department in San Francisco to Los Angeles, where he will specialize in the same line. Clark J. Harbaugh, who had been chief clerk with Mr. Titus when the latter was in charge of the Buffalo, N. Y., branch, is now assisting Mr. Titus in Los Angeles.

Pioneer Rubber Mills, San Francisco, Calif., scored a big increase in business for 1928 over an unusually good year in 1927, and the executives see a fine prospect in 1929. The big factory at Pittsburg, Contra Costa county, Calif., is working night and day with rush orders for garden and heavy hose, belting, packing, and various mechanical goods for domestic and foreign delivery, and to keep pace with the increasing business a large extension may soon be made to the plant. The official personnel seldom changes, the following having been in their respective positions for many years: President, G. S. Towne; vice presidents, H. R. Mansfield and D. D. Tripp; and secretary-treasurer, W. L. Reed. A recent visitor at the plant was E. P. Coxhead, manager of the Pioneer factory branch at 589 E. Illinois St., Chicago, Ill., which carries a large stock of the company's products for the convenience of midwest customers. On account of rapid increase in business, Mr. Coxhead is adding several to his staff.

General Tire & Rubber Co. held three general sales conferences on the Pacific Coast during January at which were present President William O'Neil, and General Sales Manager Benjamin Heer. The first get-together meeting of General distributers was held at Seattle, Jan. 14 and 15, the next at San Francisco, Jan. 21 and 22, and the last at Los Angeles, Jan. 24 and 25. Tom Cramer, who was long Seattle branch manager is now in charge at the San Francisco branch being succeeded in Seattle by Roy Doss, former Los Angeles territory salesman. W. F. Lynch, former manager of the Mason Tire & Rubber Co. branch at 2457 Enterprise St., Los Angeles, has joined the General sales force in the latter city, being replaced at the Mason branch by Julius Ceazam.

Goodyear Tire & Rubber Co., Los Angeles, Calif., is doing exceptionally well, according to a statement just issued by President John W. Mapel and in which he commends the sales force and the production staff for their efforts which resulted in making 1928 the best year in the company's history. Mr. Mapel says he sees no reason why 1929 should not prove to be even a much better year. The company's main anxiety now, it is stated, is to catch up with the pressure of orders, which are now well in excess of the factory capacity of some 10,000 tires a day. Within a few months, however, with the equipment being installed and the rearrangement of lay-out which is being made, it is said the works will be able to turn out 2,500 tires more each day. Last September the company started a contest among its 3,500 dealers in the eleven western states served by the Los Angeles concern, the main features of which consisted not so much of sales records or volume but in the evolving of useful ideas for marketing tires. The reward was a trip to Los Angeles and it went to six scoring highest. The first to make the trip at the company's expense was Earl W. Moses of the Eugene Vulcanizing Works, Eugene, Ore. On arriving he was entertained by President Mapel, General Superintendent E. J. Thomas, Sales Manager J. K. Hough, Comptroller H. J. Young, Manager of Truck Tire Sales A. N. Day, and J. X. Kennelly, in charge of sales promotion.

India Tire & Rubber Co. may be the next Akron concern to build a tire factory in Los Angeles. The rumor was revived on the occasion of the recent visit of Vice President and Sales Manager Frank L. Ryan to the southwest city in connection with the closing of a contract with Nelson & Price for the delivery of $5,500,000 worth of tires within the next three years. Mr. Ryan said that on returning to Akron he would take up with the India officials the question of establishing a factory in the Southwest and he believed that sentiment in favor of such a project is quite strong.

The Board of Public Works of Los Angeles has ordered that all horses used for hauling city refuse trucks must be fitted with rubber horseshoe pads.

Fisk Tire & Rubber Co., according to C. C. Fletcher of the Pacific Coast Division, and who has been spending several weeks visiting the branches in the Mid-Coast and Northwest sections, has fared very well in the territory which Mr. Fletcher covers, scoring a good increase in 1928 and with every indication of substantial growth in 1929. The company last month took possession of its new $500,000 general office and warehouse building, S. Hope and 35th Sts., Los Angeles, Calif. It has over double the capacity for storage of the former Fisk building, every up-to-date convenience, and here will also be the general offices for the Coast business.

Huntington Rubber Mills, Portland, Ore., had an exceptionally good year in 1928 and sees an excellent prospect in its regular lines of mechanical goods for 1929. The rubber anatomical models which the concern has been making under the direction of the Oregon Medical School are developing very satisfactorily, and the growing demand for them has provided unusual manufacturing and sales problems. Thus far only the obstetrical model has been put on the market, and it is in use in numerous medical and nurse-training schools in the United States, Canada, and Australia. Research work has been completed for the male manikin and molds are now being made. It will have nearly 150 parts of many kinds of rubber and will, it is said, be a remarkable copy of the human organism.

Hood Rubber Products Co. reports sales of tires, tubes, heels, footwear, and battery boxes on the Coast as very good. Pacific Coast District Manager J. J. O'Connor, 450 Ninth St., San Francisco, Calif., has had as a recent guest Ernest Clark, manager of footwear sales at the Hood works, Watertown, Mass., and who has been making a close study of trade needs on the Coast.

Paragon Rubber Products Co., 4827 Huntington Drive, Los Angeles, Calif., has been taken over by former Vice President and Secretary Harold G. Cogswell although it will be operated under the old name for some time. The plant is working 16 hours daily on oil well specialties and general mechanical goods and has for awhile ceased making tire repair materials.

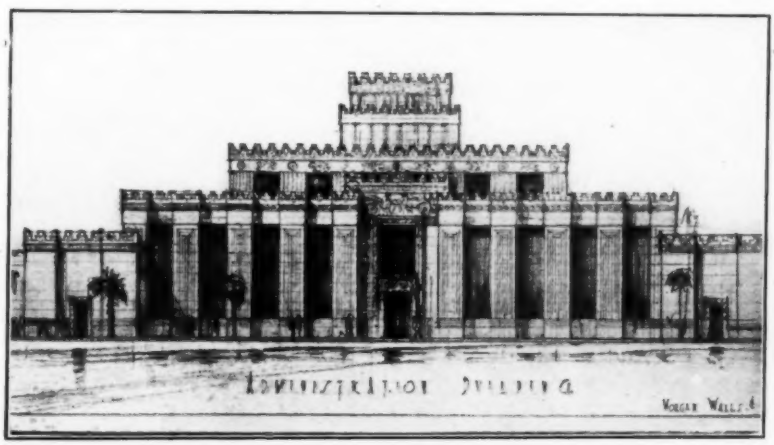
West American Rubber Co., 400 North Ave. 19, Los Angeles, Calif., had an exceedingly good year in 1928 and the outlook for 1929 is very encouraging. Several more hydraulic presses have lately been installed, besides other equipment. Heavy hose and packing are being shipped steadily to the oil fields of the Pacific Coast, the Midwest, Dutch East Indies, Rumania, British Burma and South America, one specialty in strong demand being a dual control for oil-pumping hose, and for which a patent has been applied. Vice President Charles Lamb recently returned from a visit of several months in England, where he studied many rubber manufacturing processes.

A. Schleicher

Samson's Unique Tire Factory

Massive Construction Typifying Strength to Feature Ultra Modern Eight Million Dollar Pacific Coast Plant

THE recent announcement by A. Schleicher, pioneer of the tire industry in Los Angeles, founder and president of the Samson Tire & Rubber Corp., of the immediate construction of a new factory with a plant capacity of 6,000 tires and 10,000 tubes daily, the project involving an outlay of over $8,000,000, climaxed an epochal year in which Los Angeles had quickly advanced to the place of second largest tire manufacturing center in the world. The new plant, which it is planned will be completed well before the end of 1929, will employ some 2,500 people and have a payroll of over $2,500,000 a year.



Building operations will be started within the next few weeks on a 40-acre site on Telegraph Rd. just east of Atlantic Blvd. in the Union Pacific industrial tract. The factory will be one of the most unusual and distinctive industrial structures ever erected on the Coast. Taking its cue from the name Samson, with its implication of great strength, the architecture will also recall the period of the heroic biblical figure, and be of massive Babylonian style.

The administration building in the center of the tract will be of heavy proportions and its several stories will have a pyramid effect. Extending for about a quarter of a mile on either side will be a huge pillared wall. For the entire distance back of the administration building and the walls, will stretch the factory structures constructed of heavy blocks of stone, their fronts ornamented with Babylonian decorations in stone.

The management aims to make the Samson plant the most modern tire factory in the world. The expansion had been under consideration for two years, it having become increasingly evident during that time that facilities in the old No. 1 plant at Compton, although repeatedly enlarged, and at the No. 2 plant in San Diego, and other structures utilized, could not long supply the fast-growing demand. Active work on plans for the new plant have been carried on by Mr. Schleicher and his engineers for over a year, and during which the company's experts have toured the United States inspecting modern rubber factories and other plants of known efficiency, adapting and utilizing ideas and methods from scores of progressive concerns. These have been added to and many new machines and processes invented and developed by and for the Samson organization to facilitate the output of high grade products.

Practically all the machinery for the plant has been ordered, over 100 carloads of equipment having been specified to date. An order from one concern totals over 3,000,000 pounds of machinery.

The latest and most complete conveyor systems will be installed to insure maximum advantage in rapid, continuous-flow production, and the plant will not only be a model of efficiency, but it will be provided with every known form of labor-saving device and the newest features for making working conditions safe and pleasant for the small army of operatives. It will be necessary to use the entire plant capacity at the outset, and the factory is being so designed that it can be readily enlarged to take care of further increase of production, which it is believed will be required almost as soon as the present units are completed.

From very small beginnings, Samson growth has been steady but rapid. Having gained a firm foothold on the Pacific Coast, it later took advantage of the low freight rates through the Panama Canal to extend sales on the eastern seaboard. Selling operations continued to spread until now the products are distributed over practically the entire country. While the Samson concern has been developing into one of the major American tire making establishments, three of the largest producers in the industry have established factories in the Southwest.

The success of the Samson corporation is regarded as not only an outstanding accomplishment of Southern California business but as a tribute to the personal ability of President Schleicher, who, though yet in early middle age, has led an eventful and active life with several records of success prior to the Samson achievement. He was called from Purdue University just prior to his graduation to build what was then the second largest

underground telephone system in the world. Following this he spent several years in the construction of interurban lines in the Middle West. Going to California, he early developed one of the largest and most successful of southwest real estate operations.

Mr. Schleicher, besides being the presiding genius of the Samson concern, is a director of the Fidelity Savings & Loan Association, the Security Title & Guaranty Co., and the Los Angeles Chamber of Commerce. He is chairman of the Manufacturing Industries Committee of the Chamber, is a director of the California Manufacturers' Association, member of the Board of Governors of the Foreign Trade Club, and founder and president of the Monterey Park Land Co.

Samson Breaks Ground

Samson Tire & Rubber Corp. broke ground on Jan. 23 for its new $8,000,000 tire plant in the Union Pacific Industrial Tract on Telegraph Rd., just east of Atlantic Blvd., Los Angeles, Calif. A notable feature was the civic celebration under the auspices of the Chamber of Commerce, the East Side Organization, and various social and industrial groups. The ceremony was preceded with a parade in which were four bands and over 200 cars; above the paraders airplanes sprinkled confetti. At the grounds pilots of the Western Air Express gave an aerial circus and Spanish entertainers held a colorful fiesta. President G. W. C. Baker of the East Side Organization was master of ceremonies. Addresses were made by Mayor Cryer, Chairman McClellan of the County Board of Supervisors, President Crandall of the Chamber of Commerce, President Gray of the Union Pacific System, and President and Founder A. Schleicher of the Samson corporation. The latter's daughter, Miss Gretchen, turned the first spadeful of earth for the building.

R. J. Cope, general manager of the new Firestone tire works in Los Angeles, has again been promoted, having been chosen by the directors of the Firestone Tire & Rubber Co. of California as a vice president. He will be second in command, Russell A. Firestone, son of Harvey S. Firestone, Sr., being first vice president and in charge of the $7,000,000 concern.

Kirkhill Rubber Co., 5811 S. Hoover St., Los Angeles, Calif., according to Treasurer and General Manager T. Kirk Hill, had a twenty per cent gross increase in sales for 1928 and anticipates even better progress in 1929. The company supplies lines of rubber goods that few other factories handle, and its specialties total over 1,700 different sorts. One of the newest is a special cork for a water-softener container, and of which 250,000 are being produced monthly. The concern is running 24 hours a day, has been duplicating all its important machinery, recently installed a 3-inch tubing machine, and is planning to put in a No. 3 Banbury.

Dunlop Tire & Rubber Co.'s business on the Coast fairly doubled in 1928, according to Pacific Coast Division Manager R. R. Fox, whose headquarters are in San Francisco, Calif. He expects a visit about Feb. 1 from Production Manager Archibald Harp of the Dunlop works in Buffalo. Not only have tire sales been exceptionally good, but imported and domestic Dunlop golf balls are in unusually good demand. Collections are also said to be surprisingly good for the beginning of the year. The company has been trying out its newly-designed "winterized" tire and reports that it is being well received even where icy conditions give but little trouble. Mr. Fox spent some time in January inspecting the Dunlop branches in Phoenix, Ariz., and Las Vegas, N. M. Dunlop is said to consume at its New England fabric mills the bulk of the fine cotton grown in Imperial Valley, Calif.

Canada

The booking season for spring shipment having ended, expectations are that prices on garden hose may go up five per cent. Low prices in the United States caused the reduction in prices at the beginning of the season and since then garden hose has been priced at a comparatively low level.

Prices have not been announced on rubber footwear for next season. The feeling in the trade is that they are going to be lower than at present, but in any case they would not be effective before March 1.

The retail shoe trade should appreciate the prompt service given by the rubber manufacturers who are making prompt deliveries when dealers need new assortments. One leading retailer said that if he could only get deliveries of leather goods as he needs them, his worries would be lessened.

Goodyear Tire & Rubber Co. of Canada, Ltd. The splendid radio programs broadcast weekly by this firm from Stations CKGW, Toronto, and CFCF, Montreal, are thoroughly enjoyed by the public.

Dunlop Tire & Rubber Goods Co., Ltd., is advertising a new tire, "winterized," which we understand is especially designed and constructed for winter driving. Perhaps the most important innovation is the claim that it can be used safely without chains, due to sharp rectangular knobs on the tread similar to the cleats on the sole of a football shoe.

Earl W. Be Saw, vice president of Firestone Tire & Rubber Co. of Canada, Ltd., Hamilton, Ont., spoke on "Rubber" at a recent weekly luncheon of the Kiwanis Club of Montreal, at the Windsor Hotel.

Hilder Rubber Co., Ltd., Toronto, is in bankruptcy and Humphrey Colquhoun has been named custodian.

Goodyear Tire & Rubber Co. of Canada, Ltd., reports that the first quarter of the fiscal year which ended Dec. 31, 1928, exceeded any other similar quarter both in earnings and volume of business, and it is anticipated that 1929 will be a profitable year for Goodyear shareholders.

Colonel A. E. Massie, Maritime Province sales manager of the Dominion Rubber Co., Ltd., with headquarters at Saint John, N. B., is once more on the job after a critical illness.

J. Herbert Coffey, Jr., managing director, Gutta Percha & Rubber, Ltd., Toronto, recently contributed a special feature article to the *Monetary Times Annual Statistical & Review Number* on the rubber industry in Canada during the year 1928.

Firestone Tire & Rubber Co. of Canada, Ltd., gave a dinner last month at the Place Viger Hotel, Montreal, to 225 of its dealers in the Province of Quebec. The principal speakers were J. A. Livingston, sales manager of the company, Mr. Dube of the Quebec Tire & Vulcanizing Co., Quebec City, and Russell Kelly of the Hamilton Advertising Agency, Hamilton, Ont.

HEATER ROOM IN PACIFIC GOODRICH PLANT WHERE SILVERTOWN TIRES ARE VULCANIZED

Obituary

A Veteran Rubber Man

Charles A. Daniel, president of the Quaker City Rubber Co., Wissinoming, Philadelphia, died at his home, 1520 Spruce St., Philadelphia, Pa., on Monday, Dec. 24, after a brief illness. He was buried at West Laurel Hill Cemetery on Friday, Dec. 28, and his funeral was attended by a large number of men prominent in the manufacturing and financial circles of the city.

Charles A. Daniel

Mr. Daniel spent most of his life in Philadelphia. He originally intended to make pharmacy and chemistry his profession, and after being graduated from the Philadelphia College of Pharmacy entered upon a pharmaceutical career, but in a short time felt that the rubber industry offered a wider field of activity. Later, he established the Quaker City Rubber Co. He was much interested in the export trade and his products soon enjoyed an international reputation for quality. In addition to devoting his time to the manufacturing business, he always maintained a deep interest in financial affairs and was, up to the time of his death, a director of the Fourth Street National Bank, now the Philadelphia National Bank.

Keenly interested in everything pertaining to the development of Philadelphia as a manufacturing city, he was among the original trustees appointed to develop the work of the Philadelphia Commercial Museum. He was also a member of the Philadelphia Chamber of Commerce, the Pennsylvania Chamber of Commerce, the National Chamber of Commerce and the International Chamber of Commerce. He was for some time a trustee and member of the Grace Baptist Church, Philadelphia, and at the time of his death was a member of Chelsea Baptist Church, Atlantic City, in which city he maintained his summer residence.

Mr. Daniel was a member of the Pennsylvania Society of the Sons of the American Revolution, the Union League, the Manufacturers' Club, Union Lodge No. 121, Free and Accepted Masons, and Corinthian Royal Arch Chapter No. 250, all of Philadelphia.

He is survived by his widow and two married daughters.

Nigel G. Bruce

Nigel G. Bruce, associated for the past fifteen years with the Goodyear Tire & Rubber Co., Akron, O., passed away Jan. 2, 1929, at the Peoples Hospital, peritonitis being the cause of death. He was thirty-seven years of age.

Mr. Bruce was on the staff of the Goodyear experimental department and had resided in Akron ever since his graduation from Washington-Jefferson College, Washington, Pa. He was a member of the Masonic, University and Fairlawn Country clubs.

He is survived by his widow, Elizabeth Watt Bruce, his parents, three brothers and two sisters.

Grandson of Joseph Banigan

Robert J. B. Sullivan, grandson of the late Joseph Banigan, former "rubber king" of Woonsocket, R. I., died Jan. 5 at Providence, R. I., after an operation for appendicitis. He was born 41 years ago in Fall River, a son of the late James E. and Alice M. (Banigan) Sullivan, and came to Providence at an early age, being graduated from Brown University with the class of 1909. During the World War he served in France with the Fourth Division, A. E. F. Mr. Sullivan was president and treasurer of the Rhode Island Web Co., Providence, a director of the American Wringer Co., Woonsocket, and the Standard Mohair Plush Co., Boston, and a member of the Noonday and Rhode Island Country Clubs and the American Legion. He is survived by a son, one daughter and two brothers, all of Providence, R. I.

Horace L. Williamson

Horace L. Williamson, an official of the United States Rubber Co., died instantly from injuries received from an accidental fall from a window of his apartment at 161 West 54th St., New York, N. Y., on Jan. 4. While attempting to open a window, he lost his balance and fell.

Mr. Williamson was associated with the U. S. company for twenty years, his first connection being in the general sales department of Revere at Chelsea. In 1910 he was appointed manager of the Revere branch at Chicago and in 1915 was made general sales manager of Revere. In 1924, he was appointed to the post he held at the time of his death.

A native of Philadelphia, Mr. Williamson was born on May 16, 1865. He was a widower, his wife having died several years ago.

Funeral services were held in New York on Jan. 7.

Almanac Cloth

Almanac cloth is familiar to the mechanical rubber goods and footwear divisions of the rubber industry as osnaburg. Its new name was apparently given to suggest its all-the-year-around utility for other than industrial purposes. In the cotton growing South people make clothing of osnaburg or use it for cotton picking bags, potato sacks and other articles requiring strong fabric. Its unbleached natural color and the irregularities of its coarse, loose weave make it suitable for portiers or window curtains.

In a short time osnaburg, almanac cloth or Greenville cloth as it is also known will be accepted for all sorts of household uses. If natural undyed osnaburg is used, articles made of it harmonize very satisfactorily with more colorful furnishings or it can be easily dyed to match or blend with any color scheme.

Prize for Name

A prize of one hundred dollars in cash was awarded to Leslie N. Rowe, tire repairman for the Crissey Tire Shop of Lake Park, Iowa, by the United States Rubber Co., for the best name for a new airbag soon to be placed on the market. The name selected by the judges was Supercore, and was fourth on the list of thirteen names submitted by Mr. Rowe.

How Speed Ruins Tires

In British tire tests in which two casings of the same size and make were used, one ran 5,000 miles on a touring car under ordinary conditions, whereas the other did but 335 miles at 90 miles an hour on a sport roadster at a racing track, yet the latter tire was found to be as much worn down as though it had been run side by side with the tire on the touring car. Such ratio of mileage, 15 to 1, is cited as aptly illustrating the highly damaging effect of speed and acceleration on tires.

Rubber in Filter Paper

In a new process paper filter packs for edge filtration are said to be much improved by treating the paper with solutions of crude or chlorinated rubber, nitrocellulose, cellulose esters, etc.—Canadian patent 281,702. Hele-Shaw and Pickard, July 17, 1928.

Rubber Weights Silk

Supplanting various long-used materials for adding weight to silk, rubber in a colloidal state in solution is now applied to the (natural) silk threads before or after weaving. It is said to impart an excellent body to the fabric and also makes it quite water-resistant.—U. S. patent 1,684,286, Sept. 11, 1928. R. J. O'Brien, Jr., assignor to Collway Laboratories.

Vanderbilt Testing Laboratory

THE R. T. Vanderbilt Co., has built on a two acre plot at East Norwalk, Conn, one hour from Grand Central Station, New York, a three-story brick laboratory completely equipped for chemical and physical testing.

The ground floor is devoted to the power and heating equipment consisting of two oil heated boilers, for heating and vulcanizing purposes. On this floor also is a mixing room where rubber is broken down, and master batches and black mixings made.

The second floor contains the compound room, physical testing department and a room insulated for temperature and humidity control with refrigerating and humidifying equipment. The equipment of the physical testing room includes laboratory size mills and calenders, vacuum drier, presses, hot air vulcanizers and a laboratory Banbury mixer, of which only two other laboratories in America are equipped. The platen presses are operated electrically instead of by hydraulic power. The testing equipment also includes Scott tensile testers, flexing and abrasion machines. The Scott tensile machines are provided with hot and cold water tanks for high and low temperature testing. The flexing machine is also equipped with heating and cooling devices.

The third floor is occupied by a well-equipped chemical laboratory and electrical testing room with high voltages available for investigation of the effect of antioxidants in oils, a development which is being pioneered by the Vanderbilt company.

The laboratory will be operated by the company's staff of engineers and chemists under the direction of Dr. A. A. Somerville.

Nine Pence Rubber

A number of estimates have been made as to the proportion of estates for which about 9 pence per pound for rubber is an economic figure and it is generally agreed that this price would involve about one-third of estates in actual loss. Such estimates can only be tentative because under stress of necessity the possibilities of economy are apt to become more apparent than they were.

Akron Rubber Stock Quotations

January 21, 1929

Company	Bid	Asked
Akron R. R.	23	24
Akron R. R., pfd.	...	100
Falls	6	7⅞
Faultless	38	40
Firestone	...	240
Firestone, 6% pf	108½	111
Firestone, 7% pfd.	110½	110¾
General	260	264
General, 6% pfd.	101	105
Goodrich	100	101
Goodrich, pfd.	114½	115½
Goodrich, 6½s	107½	107¾
Goodyear	128½	129½
Goodyear, 1st pfd.	103	104
Goodyear, 5s, 28	99½	104
Goodyear, 5½s, 31	...	100
Goodyear, 5s 57	93	93½
India, com.	45	47
India, 7% pfd.	...	95
Miller	24	25
Miller, 8% pfd.	81	82
Mohawk	60	...
Mohawk, 7% pfd.	81	90
Rubber Service	...	40
Seiberling	59½	60
Seiberling, 8% pfd.	106	107

New York Stock Exchange Quotations

January 22, 1929

Company	High	Low	Last
Ajax	11	10¼	10⅞
Fisk	19⅞	18⅜	19⅜
Fisk, 1st pfd.	69⅞	69½	69⅞
Fisk, 1st pfd. cv.	80	77	80
Goodrich (4)	102¾	99⅞	101¾
Goodyear	133½	126⅛	130½
Goodyear, 1st pfd. (7)	103½	103½	103½
Intercontinental	12⅞	12½	12⅝
Kelly-Springfield	23	22	22½
Kelly-Springfield, 6% pfd.	99	99	99
Lee	23¼	22⅞	23⅛
Miller	25¾	24¼	25¾
Norwalk	6⅛	5⅛	6⅛
U. S. Rubber	52¾	50⅝	52
U. S. Rubber, 1st pfd.	89½	88	88½

Rims Approved by Tire & Rim Association

Rim Size	December, 1928 Number	December, 1928 Per Cent	12 Months, 1928 Number	12 Months, 1928 Per Cent
Motorcycle				
28 x 2½	.....	....	.....	....
24 x 3 CC	2,750	0.2	23,177	0.1
24 x 3 Std.	.....	....	20,046	0.1
26 x 3 CC	927	0.1	3,783	0.0
26 x 3 Std.	250	0.0	48,302	0.2
28 x 3 CC	.....	....	452	0.0
28 x 3 Std.	.....	....	301	0.0
Clincher				
30 x 3½	17,905	1.6	771,489	3.2
31 x 4	.....	....	4,386	0.0
18" Balloons				
18 x 3½	.....	....	9,362	0.0
18 x 4	37,469	3.4	1,187,890	4.9
18 x 3.25	.....	....	148,278	0.6
18 x 4½	18,158	1.6	172,529	0.7
18 x 5	2,484	0.2	12,686	0.1
18 x 6	14	0.0	14	0.0
19" Balloons				
19 x 2.75	6,126	0.6	208,017	0.9
19 x 3½	23,057	2.1	1,664,059	6.9
19 x 4	165,000	15.0	2,845,986	11.7
19 x 3.25	6,891	0.6	52,695	0.2
19 x 4½	28,426	2.6	917,444	3.8
19 x 5	14,052	1.3	95,528	0.4
19 x 6	15	0.0	15	0.0
20" Balloons				
20 x 2.75	240,028	21.8	709,501	2.9
20 x 3½	3,170	0.3	402,058	1.7
20 x 4	135,871	12.3	3,266,779	13.7
20 x 4½	46,367	4.2	681,473	2.4
20 x 5	25,510	2.2	716,939	3.0
20 x 6	4,717	0.4	115,865	0.5
21" Balloons				
21 x 2.75	16,864	1.5	4,740,946	19.6
21 x 3½	37,063	3.4	977,026	4.0
21 x 4	5,962	0.5	530,703	2.2
21 x 4½	4,937	0.4	297,251	1.2
21 x 5	318	0.0	12,439	0.1
21 x 6	.....	....	7,633	0.0
22" Balloons				
22 x 3½	.....	....	1,775	0.0
22 x 4	.....	....	4,118	0.0
22 x 4½	.....	....	4,826	0.0

Rim Size	December, 1928 Number	December, 1928 Per Cent	12 Months, 1928 Number	12 Months, 1928 Per Cent
High Pressure				
30 x 3½—23	3,548	0.3	117,205	0.5
31 x 4 —23	.....	....	640	0.0
32 x 4½—23	6,742	0.6	109,578	0.5
32 x 4 —24	3,055	0.3	95,153	0.4
33 x 4½—24	.....	....	2,613	0.0
32 x 3½—25	.....	....	155	0.0
33 x 4 —25	.....	....	3,403	0.0
34 x 4½—25	874	0.0	10,567	0.0
20" Truck				
30 x 5	181,978	16.4	2,380,846	9.8
32 x 6	24,132	2.2	463,438	1.9
34 x 7	12,177	1.1	136,705	0.6
36 x 8	9,656	0.9	85,460	0.4
40 x 10	306	0.0	4,547	0.0
22" Truck				
36 x 7	400	0.0	10,199	0.0
38 x 8	556	0.1	2,080	0.0
24" Truck				
34 x 5	2,413	0.2	18,359	0.1
36 x 6	2,687	0.2	41,543	0.2
38 x 7	2,552	0.2	54,145	0.2
40 x 8	3,985	0.4	35,387	0.1
44 x 10	309	0.0	1,105	0.0
Airplane				
8 x 3 SS	.....	....	101	0.0
12 x 3 SS	45	0.0	397	0.0
18 x 3 SS	.....	....	495	0.0
20 x 3 SS	.....	....	6	0.0
20 x 3½ SS	163	0.0	1,786	0.0
20 x 4 SS	.....	....	1,171	0.0
21 x 4 SS	.....	....	21	0.0
20 x 5 SS	.....	....	98	0.0
20 x 6 SS	1,284	0.1	4,093	0.0
20 x 8 SS	.....	....	331	0.0
24 x 10 SS	.....	....	111	0.0
18 x 4 CL	.....	....	9,773	0.0
Totals	1,101,193	....	24,247,282	....

The Rubber Industry in Europe

Great Britain

Ormsby-Gore's Report

W. G. A. Ormsby-Gore, M. P., Under Secretary of State for the Colonies, returned from his visit to the Far East some time ago. From his report just issued, it appears that he was much impressed by the work done in Java and Sumatra on bud grafting and seed selection. What he saw and heard in the Dutch centers has convinced him that on research rather than on any system of restriction, depends the future prosperity of the rubber industry.

From his speeches in the East one could gather that he was not in favor of the continuation of restriction and in his report he explains why it was a failure. First, restriction and high prices encouraged production outside restriction area and the use of reclaimed rubber in the United States. It was therefore becoming ineffective as a regulator of rubber prices and was likely to become increasingly ineffective the longer it continued. The second point was that government interference undermined efficiency, handicapped scientific development, and discouraged a progressive attitude to higher yields and improved methods of cultivation.

Native production in the Dutch East Indies is another factor to be considered. When the Stevenson scheme was introduced, the extent and production of native holdings were not taken into consideration. But now it appears that the increased production in the Netherlands East Indies which was chiefly responsible for the failure of restriction was mainly due to output from native holdings. This output, says the Under-Secretary, is the chief obstacle to all schemes of restriction and coordination and introduces an element of competition which is destined to put the European estates, with their high overhead charges and costly management, to a severe test. "Those British rubber planters and directors," he continues, "who are skeptical as to the possibilities of bud grafting and scientific research may well ask themselves whether they will be able in the long run to compete with the native small owner."

In five or six years' time Mr. Ormsby-Gore is convinced that the competition of high-yielding estates with outputs of 1,200 to 1,500 pounds per acre will become increasingly effective and will even overshadow the menace of native rubber. In ten or twelve years' time he believes that no European estate with an output of less than 1,000 pounds per acre will be able to survive.

In stressing the importance of scientific research and the prospects of greatly increased yields and correspondingly lowered costs, he once more prophesies the doom of unprogressive estates and decries the attitude of certain companies which ignore research and expect the government to fix prices on what the least efficient estates consider a reasonable level. He concludes by stating that the definite removal of restriction will restore the spirit of self-reliance and initiative on which the prosperity of the rubber industry depends.

While one is inclined to agree with Mr. Ormsby-Gore, it is true that many firms and individuals in looking to some form of price fixing as a panacea for the ills of the rubber industry, were apt to discount the importance of scientific research and forget individual initiative. One cannot help thinking that he is optimistic about the results of bud grafting and seed selection. Though moderate expectations regarding increased yields and lowered costs appear to be justified, a wholesale plunging into bud grafting by all European estates at the present stage might be quite as disastrous as total neglect of scientific progress. For time and again the experiment stations have issued warnings against the use of bud material from clones which they had approved, but which after developed undesirable characteristics.

Rubber Roads and Floors

Under the auspices of the Institute of the Rubber Industry and the Rubber Growers' Association, a conference on roadways and floorings was held at the First Avenue Hotel, London, on Jan. 3. Lieut.-Col. T. H. Chapman, consulting engineer of Rubber Roadways, Ltd., lectured on rubber roadways, and pointed out that rubber could not be used for every kind of road as price would act as a limiting factor. Again, rubber does not excel all other paving for all purposes, for each had its own merits. So far, price was the main obstacle and this would continue to be the case until rubber roads could be laid down at a cost that on the whole would prove to be economical. After reviewing the well-known advantages of rubber roads, their resistance to abrasion, power to absorb noise and vibration, cleanliness, etc., Col. Chapman concluded by stating that eventually experience and research would show the way to establish a standard rubber street paving that would be an economic investment to those cities which adopted it.

Dr. S. S. Pickles then spoke on rubber flooring. The problem here is not to be solved by experimentation so much as by educating the public to the advantages of rubber floorings. Work in this direction has brought gratifying results, thanks largely to the prevailing low price of rubber. Price being such an important factor in the rapid extension of the use of rubber flooring, rubber planters should give the matter careful consideration. The low price of rubber, he continued, must be understood to offer an opportunity, not an apology, for the wider introduction of this type of flooring, for in the past, expense had been the main obstacle to its general application, and rubber flooring had maintained its position and popularity solely by reason of its own merits.

Rubber Roadways, Ltd.

Presiding at the thirteenth annual general meeting of Rubber Roadways, Ltd., Sir Stanley Bois, stated that since it had been suggested that more demonstration roads should be laid in order to still further arouse public interest in rubber paving, the directors had decided to embark upon a program which, subject to cooperation from manufacturers and road authorities, would result in four demonstration roads, each covering an area of at least 1,000 square yards. So far three important city councils have shown their interest in the proposed plan by which the company would undertake to supply and lay rubber blocks at a cost of 30 shillings per square yard, with free maintenance for five years. This would be less than the cost of granite, and the concern has further offered to accept payment in installments.

Referring to the claims made for rubber paving regarding its absorption of noise and vibration, tests were needed to provide proof for those they wished to convert to rubber paving. To obtain such proofs was difficult, however, the Department of Scientific and Industrial Research and the National Physical Laboratory would arrange a series of noise and vibration tests.

Institution of Rubber Industry

The Seventh Annual General Meeting of the Institution of the Rubber Industry was held Jan. 3 at London. The Colwyn gold medal was at that time awarded to Dr. G. S. Whitby, McGill University, Canada. In making this, the first, award of the medal, the Council of the Institution state that "consideration has been given to scientific work which has contributed to the advance of knowledge in the industry," and that the award has been made to Professor Whitby "in view of his work on numerous important problems connected with the subject of rubber."

Professor Whitby has been occupied in the study of rubber problems for more than fifteen years, and has had direct experience in the production of plantation rubber. His book on this subject is a recognized authoritative standard. For the last seven years he has been occupied on researches of a fundamental character dealing with the problems of vulcanization, synthetic rubber and cognate colloid chemistry. Professor Whitby is a member and fellow of the institution, and was responsible for the first paper appearing in the "I. R. I. Transactions."

Among the distinguished fellows newly elected are many whose names and scientific work are internationally known in the

rubber industry. The list comprises the following fellows, among whom are a number of distinguished rubber chemists connected with the rubber industry in America: F. W. Bennett, John M. Bierer, Prof. G. Bruni, J. K. Burbridge, R. P. Dinsmore, F. Fellowes, Dr. H. K. Feuchter, Dr. W. C. Geer, Sydney Morgan, S. C. Mote, Dr. W. J. S. Naunton, C. A. Proctor, D. G. Snodgrass, Dr. David Spence, H. K. Turner, Prof. G. Stafford Whitby.

British Notes

Dr. W. J. S. Naunton has been elected honorary secretary of the Manchester and District Section of the Institution of the Rubber Industry in place of F. G. Stretch.

The British Goodrich Rubber Co., Ltd., reports net profits of £73,235 for the year ended Sept. 30, 1928, against £5,856 for the previous year. After paying preference dividends for the year ended May, 1928, transferring a sum to the preference shareholders reserve, and writing off sundry items from the balance sheet, £9,734 was left to be carried forward. The company, which was formed in May, 1924, to acquire from The B. F. Goodrich Co. of America, control of its existing selling organization in Great Britain, the sole right to manufacture and sell Goodrich products in Great Britain and Ireland, and certain rights to sell Goodrich products in other countries, has as yet paid no dividend on the ordinary shares. According to the report, although encouraging results were obtained, renewed and intensified competition again introduces an element of uncertainty.

Germany

Price Fixing

The surgical goods trade in Germany has for some time been the cause of much anxiety in the matter of price fixing and the diversion of trade from the legitimate dealers to the sick funds. The latter condition needs some explanation. In Germany the middle and working classes contribute to a sick fund in order to receive medical attention when needed, but formerly any special hygienic articles prescribed by the doctors were purchased from the usual sources. Gradually, however, the sick fund management got into the habit of buying these articles direct from the manufacturers and then selling them to the patients, thus depriving the regular dealers of this trade. As a result the wholesale dealers in surgical goods, under the leadership of the Central Union of the Surgical Trade of Germany, met on Dec. 11, 1928, at Kassel and resolved: that the wholesale trade should be so regulated that the operation and sale territories be limited, a mutual agreement be made among the various groups regarding price fixing, and the supplying of stores; that a uniform price level be fixed for all Germany, with due regard for regional requirements and differences; that the business of the sick funds should be restored to the branch stores concerned by standardizing all important articles and by uniform price fixing.

Improved Method of Making Elastic Goods

When elastic goods are manufactured, the rubber thread that is combined with the fabric and gives the article its elasticity, is stretched as far as it will go without breaking. In spite of constant care the thread is apt to snap and spring back, the broken end being difficult to locate. A broken thread in elastic goods immediately shows up in the finished article where it causes bulging and renders the piece unsaleable. The difficulty has been that the worker could not detect the break in time. But an improvement has recently been patented which causes the loom to stop immediately a thread snaps so that the worker can attend to the matter and defects in the goods are thus avoided.

This new invention provides for specially constructed wires each of which is tautly kept in place by a fully stretched rubber thread as long as the latter remains intact. When the thread breaks, the wire recoils, thus releasing a contact which causes the loom to come to a standstill.

Foreign Competition In Heels and Soles

Competition, both local and foreign, in heels and soles, has always been very keen and rubber heels particularly have long felt the edge of this, witness the low prices and the correspondingly poor quality of many German brands. Rubber manufacturers and dealers have been interested in the doings of the well-known Czecho-Slovakian shoe manufacturer Bata who has been exporting to Germany large quantities of shoes supplied with rubber heels and soles, the products of his own factory. Hitherto, he supplied the regular German wholesalers and retailers, but it is now learned that he is planning to cut out the wholesalers and dealers and instead to grant sole selling rights for the Bata products to a number of reputable shoe stores.

New Rubber Goods

A mask for those suffering from asthma has appeared on the market. On the whole it resembles the usual type of rubber mask except that it is furnished with a mouthpiece which is connected with an oxygen apparatus by a tube. The tube is about one to one and one-half yards long and can easily be slipped over the conical attachment of the oxygen apparatus. The mask could also be used for inhaling. While it seems to be a useful article, it could be improved as far as appearance is concerned; just at present it has a hideously deforming effect.

A demand from the tropics for a suitable outfit for those working on plantations under damp conditions, has led to the introduction of a new type of working garment. This consists of a one-piece suit of strong rubberized doubled fabric, with long or short sleeves and trousers and, if desired, a hood at the back. It is fastened by snap buttons.

Zieger & Wiegand, Leipzig-Vo., manufacturer of rubber novelties, have thought of something new. This time it is a rubber plaque depicting landscapes, portraits, religious subjects, etc. The original plaque commemorated the Schubert centenary and represented a group of houses in the background, a tree and reclining figure in the foreground, and a bust of Schubert with inscription, all in relief. The plaques were of various colors, thus the Schubert plaque was seen in brown and also in white, while a religious subject was put out in tones of silver.

German Notes

Deutsche Macinlop G.m.b.H., Hamburg, was formed in November to import, export and sell rubber goods of all kinds, especially the products of Macinlop Ltd., London and Manchester. The new concern also has the selling rights for Germany of Dunlop golf and tennis balls, tennis rackets and other sporting goods, and in addition represents Wm. Gibson & Co., Ltd., Kinghorn, manufacturer of golf clubs. The management of the German undertaking is in the hands of Fritz H. Grager.

G. & A. Thoenes, Sachsische Asbestfabrik, Radebeul-Dresden, has just celebrated the 50th year of its existence. On Dec. 5, 1878, August Thoenes, up to that time connected with the Continental Caoutchouc-und-Gutta-Percha Compagnie, Hannover, founded an agency in mechanical goods. Later his brother Gustav joined him and soon the young firm was importing asbestos goods from England. The firm began to manufacture greases and the success obtained encouraged the manufacture of packing and goods of asbestos and rubber. In 1912 the firm introduced its own brand of It-packing, known as Wattit, which has become well-known in Germany and abroad. The founder of the firm has retired from business, his brother and partner, Gustav Thoenes, died in 1923, and at present the management is in the hands of the sons of the two brothers, Carl and Kurt Thoenes.

Tire Factory for Czechoslovakia

The Zivnostenska Bank, Prague, is willing to furnish all the capital required to establish a tire factory in Czechoslovakia, provided that it could have the benefit of American experience. The bank feels that this could only be obtained through association with a first-class American tire manufacturer and naturally assumes that such a firm would not be interested in the proposition unless it participated financially as well.

The Rubber Industry in the Far East

Malaya

Rubber Estimates

This year E. A. Barbour has again submitted to the public his views on the rubber industry outlook for the coming year. On Nov. 5, 1927, he estimated that world's consumption for 1928 would exceed production by 100,000 tons, and that London and New York stocks as of Dec. 31, 1928, would not exceed 66,000 tons. Had restriction not been removed, he feels sure that his figures would have been practically correct. Estimates for 1929 are necessarily difficult, because of the uncertainty regarding surplus stocks accumulated in Malaya prior to the removal of restriction, but from calculation and investigation he has taken a figure of 55,000 tons as the maximum excess in hand at Nov. 1, 1928. As it is impossible to say to which country these stocks will be shipped, they have been included in Singapore and Penang stocks in dealers' hands.

WORLD'S STOCKS DEC. 31, 1927

	Tons	Tons
London	66,000	
New York	102,000	
Singapore and Penang	25,000	193,000
Production 1928 (including excess export rights used).	550,000	
Accumulated excess stocks available Oct. 31, 1928....	55,000	605,000
Total available 1928.....		798,000
Consumption 1928		658,000
World stocks Dec. 31, 1928 (approximately)		140,000
(United States 50,000 tons, Great Britain 15,000, Malaya 75,000).		
Estimated Production 1929—		
Malaya	314,000	
Ceylon	50,000	
Netherlands East Indies (Estate)	110,000	
Netherlands East Indies (Native)	120,000	
Brazil	18,000	
Indo-China	12,000	
Sarawak and Borneo	20,000	
Burmah and India	20,000	
Wild	6,000	
		670,000
Total available 1929		810,000
Estimated Consumption 1929		
United States	450,000	
Canada	34,000	
United Kingdom	60,000	
France	35,000	
Mid-Europe	45,000	
Italy	12,000	
Japan	28,000	
Australia	15,000	
Russia	17,000	
Scandinavia	6,000	
Belgium and Holland	6,000	
Rest	2,000	710,000
Available stocks Dec. 31, 1929		100,000

Mr. Barbour's opinion is that output for 1930 will not be greater than for 1929, as the very large areas that have been resting in Malaya will give their maximum crop in 1929, and thereafter output will diminish. He believes that there is increasing difficulty in procuring labor for estates in Sumatra and accordingly he does not look for any increase from Netherlands East Indies estates. Consequently, allowing for a production in 1930 of 670,000 tons, and a consumption of 740,000 tons, which he considers a not improbable figure, he comes to the conclusion that in 1930 we should have a reduction in world stocks of 70,000 tons. From which follows that present low prices are not likely to continue for many months, and once the November-December panic is over, and forced selling ceases, he expects an appreciable rise in values.

Hopeful Views

Mr. Barbour is not alone in his expectations of better prices soon, although he is among the few that foresee a rise within the next few months. Others are more conservative and do not look for a favorable change before the last half of 1928. Others appear to have resigned themselves to a dividendless 1929, but expect something of a boom in 1930. The ever-increasing consumption, coupled with the knowledge that very little planting was done during the early restriction years and that in any case it will still require a few years before the newly planted areas reach the tappable stage, is responsible for this optimism. Again people cannot quite forget the charges of gross over-assessment that were repeatedly made throughout the restriction period and so do not look for unusually large shipments from Malaya and Ceylon, witness Mr. Barbour's Ceylon figures, which are considerably below the standard of production on which assessments in that island were based during restriction.

However, if the other charges made by the anti-restrictionists about the large amounts of rubber smuggled out of Malaya to the neighboring Dutch colonies and reimported into Malaya as Dutch native rubber turn out to be as well founded as some think they will, shipments from Malaya in 1929 may after all not fall far behind the highest figures for standard production. This, of course, would be offset by a corresponding decrease in the shipments from the Netherlands East Indies.

The *Malayan Tin and Rubber Journal* expects a boom, but when, it does not predict. "Rubber must come into its own again," it says, "because a great motoring era has opened in Europe and vast quantities of rubber will be needed for tires, and this quite apart from the rubber needed for the same purpose in North and South America. Indeed, far from considering the rubber industry to be "down and out," we most strongly incline to the belief that we will all yet see another rubber boom because of the fact that there was a great slowing up in rubber planting during the five years of restriction."

Writing in the *Straits Budget*, A. W. Still discusses the future of rubber. He is not so optimistic as the *Malayan Tin and Rubber Journal*. Under favorable circumstances, particularly if producers can make up their minds to rest their weaker areas so long as prices are at their present level, he expects an improvement in prices toward the latter half of 1929. In any case he thinks that it is sound to expect a change for the better by 1930. However, America worries him. The pool still functions. But this is not all. He is not satisfied that all is well in America itself. There is too much speculation and something serious might happen and cause a slump. Then where would rubber's best customer be!

Netherlands East Indies

The Outlook

The tendency to prophesy regarding the rubber outlook for the coming year seems much restrained, as people are probably occupied with other matters. For instance, treatment of the coolies in Sumatra and the continuation of indentured labor and the penal sanction in Sumatra, is being threshed out in council. Then there is the problem of native rubber. The rapidity with which the natives adapted themselves to the situation brought about by low prices was a mild shock to producers who thought that inability to get labor under these circumstances would check the production of native rubber. Finally there are the estate problems, the prevalence of mildew, latest results obtained from budded trees and selected seedlings, soil problems, etc.

The optimistic view of the situation is based on the known facts of increased consumption, limited areas of new plantings, and the axiom that Americans will not be able to manipulate the market all the time. Those who fear the worst, of course, are sure that America will be able to play with the market just long enough to produce another slump, and that is what they want, is it not? These people also express a good deal of uneasiness on the subject of native rubber, which they cannot dismiss lightheartedly.

Clone Course for Planters

It has become a practical necessity for estate managers and assistants to recognize the various bud grafted clones and be able to check up on them. Realizing this, the Experiment Station for Rubber

offered a course of instruction in the method of recognizing clones. This is not easy, and Dr. de Vries stated in the circular sent to estate employes, that a certain amount of natural aptitude for the work was necessary. About 29 planters who took the course learned how to recognize the different characteristics of leaf, stem and bark that are more or less pronounced in the clones. Only budded trees of 1 to 2 years were treated because they are the only ones considered.

The bud grafts of a clone inherit a number of characteristics from the mother tree, exhibiting a marked similarity with regard to peculiarities of leaf, branch, bark, etc. Some of the differences are very apparent, but in some cases the variations are more difficult to detect. Where it has been recommended to plant mixed clones, the importance of being able to tell correctly that a tree is a very good or poor yielder, fast or slow grower, susceptible to disease or not, etc., belongs to a certain clone in which the same or opposite traits predominate, is not to be underestimated.

More General Testing

At a recent planters' meeting Dr. de Vries said there was a great need for more general and efficient testing of bud grafted clones in the Dutch East Indies. Only a comparatively small number of estates are taking up this problem seriously. To illustrate the importance of this matter, Dr. de Vries referred to the new sugar clone 2.878 P. O. J. which has proved so successful. This was possible because the Sugar Experiment Station had initiated an extensive and efficient testing service having collected a vast quantity of comparable data in a short time, so that in three years sugar planters could take a chance on planting up 90 per cent of their planted area with the new material.

They could not have taken so great a risk without a wealth of reliable data to go by. Such extensive experimentation is impossible in the case of Hevea, but, Dr. de Vries finds that a good deal more could be done than is at present. There are only eleven properly arranged testing gardens known to him that have been opened by estates working in more or less close cooperation with the experiment station. The time must come soon when every estate or group will have its own proving fields of clones so that more reliable data may be available than is at present obtainable from the ordinary type of gardens.

N. E. I. Notes

The Nederlandsch Indische Dunlop Rubber Maatschappij (The Dunlop Rubber Co. Dutch East Indies, Ltd.) according to an announcement in the *Javasche Courant*, has been registered at Batavia. The firm, which is capitalized at 200,000 guilders, divided into 2,000 shares of 100 guilders each, was formed particularly to deal in automobile tires, accessories, and other rubber goods.

Handelsvereeniging Amsterdam, (Commercial Association Amsterdam), has just celebrated the fiftieth anniversary of its formation. The firm was established in 1879 for commercial purposes. As a matter of fact, any kind of participation in estates was expressly forbidden. But the concern could not operate for long without forming connections with plantations. Now the firm produces about 11 per cent of the total sugar output of Java; in addition it owns four tapioca and fiber estates; one rubber estate, one rubber and coffee estate, all in Java, besides five tea estates, four fiber estates, four rubber estates, and two oil-palm estates, in Sumatra. The report of the H. V. A., as it is known, shows that for 1927 the plantation's profits, not including sugar, came to 12,500,000 guilders. The original capital of 1,250,000 guilders has been increased until it reached 40,000,000 guilders in 1927. Since 1914 the dividends have averaged 32 per cent.

Russia

Analysis of the rubber footwear market in Russia shows that about 33,000,000 pairs went to fill home demands during 1928 and it is expected that this amount will increase to 37,800,000 pairs during 1929. The remarkable progress in rubber footwear production made in Russia during the last six years is best illustrated by a comparison with the home consumption during 1913, the last full pre-war year.

	1000 Pairs	Percentage compared With 1913	Percentage compared With Previous Year
1913	32,000	100	....
1923	3,929	12.2	....
1924	7,753	24.1	197.3
1925	16,642	51.7	214.7
1926	23,667	73.5	142.1
1927	28,975	90.0	122.4
1928	33,000*	102.5	133.8
1929	37,800†	117.4	114.5

* Approximately.
† Estimated.

The 1913 sales were exceeded in 1928 and although after 1925 the rate of increase diminished, the rise in consumption continued to develop steadily and the annual increase is fairly high. As a matter of fact, in prewar times the rate of increase was less, probably because in those days Russia produced a large amount of leather and the people could make their own shoes of leather cheaply enough. Now, however, rubber shoes are cheaper, taking the place of felt shoes, and are worn practically the year round.

It is also noted that while at present the demand for rubber footwear in the city continues to be greater than from the country, the city consumption is decreasing while the use of footwear in the villages is rapidly increasing. The reason is that the state attends to the needs of the villagers, as far as manufactured products are concerned, before supplying the city, because it is essential to be on good terms with the farmers in order to be able to secure the grain they grow.

Although home production of rubber footwear does not yet fully cover that consumed locally, an export business is developing and in 1926, 141 tons of rubber footwear, valued 646,000 rubles were exported, while the amount in 1927 was 210 tons, valued 811,000 rubles.

Australian Rubber Combine

A cable sent to the *Financial Times* from Sydney, announces that the Barnet Glass Rubber Co., has joined in negotiations for a merger with the Dunlop and Perdriau companies. These companies would form a powerful combination. Except for 500,000 ordinary shares in the Dunlop company, for which the English Dunlop Rubber Co. paid a premium of 5 shillings per share, with the option of a further 500,000 shares at a premium of 10 shillings, practically the whole of the capital of the three companies is owned by Australians. The total paid capital is £4,414,000, Dunlops being £2,471,000, Perdriau £1,206,000 and Barnet Glass, £737,000.

Perdriau's last profit was £213,000, and that of Barnet Glass, £105,000, while Dunlop's report showed a loss of £36,000. It is reported that Dunlops and Perdriau offered ·30 shillings for the shares in the Barnet Glass Co., as a condition of the merger.

The Dunlop Rubber (Australasia) company was registered in Victoria in 1899. It has large reserves, and of its paid capital of £2,471,000 about £520,000 is in 10 per cent preference shares. The present Perdriau company was registered in 1904, but the business dates back to 1881. Like Dunlop, this concern has a reserve of over £100,000. Its annual output is 780,000 tires, and 2,000,000 pairs of rubber shoes, while the Australian Dunlop produces 750,000 tires. The New Zealand undertaking and assets which belonged to the Australian Dunlop, were sold to the parent Dunlop Rubber Co.

In April 1925, an agreement was made between Australian Dunlop and North British Rubber of Edinburgh which resulted in the formation of a £500,000 concern to make rubber footwear in the Commonwealth.

Tire Manufacture in Australia

Tire manufacture in Australia has developed considerably in recent years. The British Rapson Tire Co. established a branch factory in Tasmania, which is producing with good prospects. The Goodyear Tire Co. has been manufacturing in Sydney for some years. The effect of all this manufacturing activity has left its mark on imports as statistics show. In the year 1925-26 tire imports came to £2,681,000, but this was reduced to £1,083,000 last year. The British figures dropped from £539,000 to £225,000; the United States from £1,372,000 to £450,000; and Canada from £501,000 to £151,000, so that local manufacturers have captured something like £1,600,000 worth of the trade.

Synthetic Rubber

Negotiations, it is said, are pending between the Continental Caoutchouc & Gutta Percha Co., Hanover, Germany, and the I. G. Farben-Industrie to produce and market synthetic rubber.

Rubber Patents, Trade Marks and Designs

Machinery Patents

United States

1,695,688.* TRIMMING MACHINE. This mechanism provides for efficiently trimming the overflow from molded articles. The cutter comprises a web which is undercut into a number of blades in such manner that the edges extend diagonally across the cutter from one side to the other. A cooperating cutting blade is mounted on an arm and both blade and arm are cut away to conform to the outer periphery of the cutter across its entire width.—P. R. Hoopes, Hartford, Conn., assignor to Essex Rubber Co., Trenton, N. J.

1,695,835.* VULCANIZER. This apparatus is adapted for vulcanizing tire carcasses and inner tubes. It comprises two annular steam chests hinged in relation to each other and adapted to embrace the respective halves of a tire mold. Control of fluid pressure is regulated by an operative valve and a locking device and clamping member actuated independently from the fluid pressure control.—Harry Willshaw, Birmingham, England, assignor to Dunlop Tire & Rubber Corp. of America, Buffalo, N. Y.

1,696,843.* AIRBAG INSERTER. This machine will insert accurately and quickly a heavy rubber airbag or expansible curing core into a tire carcass. A tire casing being supported in place on the stand of the apparatus the lower side of an air bag is set in position in the casing and its upper half is folded downward and held by a pin in a vertical bar which is actuated by compressed air. In folded position the bag is released to seat itself within the casing.—Raymond Hansen,, Cudahy, Wis., assignor to The Fisk Rubber Co., Chicopee Falls, Mass.

1,697,407.* SHEET FEEDING MECHANISM. This removes cut strips of fabric from bias cutters, especially of the traveling knife type used for obliquely cutting fabric into strips for building pneumatic tires. The chief feature is the take-off which automatically withdraws the cut strips from the remainder of the fabric and causes them to pass onto a conveyor adapted to carry them away in regular order.—F. S. Sternad, Akron, O., assignor to The B. F. Goodrich Co., New York, N. Y.

*Fictured in group illustration.

1,697,460.* VULCANIZER. This is an improved automatic regulating mechanism by which the pressure fluid for operating the locking mechanism and for governing the inflation of the airbag or tube so that the mold is effectively clamped before air is admitted for inflation. This is an effective safety device and also makes the operation of the apparatus practically automatic.—W. S. Galvin, assignor to The Akron Standard Mold Co., both of Akron, O.

1,697,703.* TIRE VULCANIZING MOLD. This invention provides an improved mold that is usable in either a watch case vulcanizer or a press heater, or, in other words, an improved mold by virtue of which more tires can be vulcanized in a given space of time than heretofore.—Claude A. Witter, Philadelphia, Pa.

1,697,955.* SHEET CUTTING MACHINE. In order to accomplish the provision of uniformly perfect tire patch material from old tire carcasses, this machine supplies a novel form of cutting, namely, an endless band knife, and a novel means for supporting, driving and adjusting it. —P. E. Hawkinson, assignor to Kehawke Mfg. Co., both of Minneapolis, Minn.

1,695,979. TUBE TESTING MACHINE. M. Reid, Vancouver, B. C., Canada.

1,696,826. MELTING PARAFFIN. E. S. Whittier, Springfield, assignor to The Fisk Rubber Co., Chicopee Falls, both in Mass.

1,696,847. STITCHING DEVICE. W. F. Irrgang, assignor to The Fisk Rubber Co., both of Chicopee Falls, Mass.

1,697,407. SHEET-FEEDING MECHANISM. F. S. Sternad, Akron, O., assignor to The B. F. Goodrich Co., New York, N. Y.

1,697,438. RUBBER-TIRED WHEELS. J. H. Wagenhorst, Jackson, Mich.

1,697,708. TIRE-HANDLING MACHINE. D. T. Blackmon, Columbia, S. C.

1,698,676. AIRBAG. H. A. Denmire, assignor to The General Tire & Rubber Co., both of Akron, O.

Dominion of Canada

285,527. TIRE MACHINE. The Dunlop Rubber Co., Ltd., London, S. W. 1, assignee of H. Willshaw, T. Norcross and F. G. Broadbent, Birmingham, all in England.

285,528. HOLDING AND VULCANIZING TIRES. The Dunlop Rubber Co., Ltd., London, S. W. 1, assignee of H. Willshaw, T. Norcross and F. G. Broadbent, Birmingham, all in England.

285,863. OSCILLATING JOINTS AND SUPPORTS. L. Thiry, Huy, Belgium.

285,870. NIPPLE PERFORATOR. E. A. Young, Wadsworth, O., U. S. A.

286,101. TIRE FORMING MACHINE. The Goodyear Tire & Rubber Co., assignee of E. F. Maas, both of Akron, O., U. S. A.

286,104. MOLD CONSTRUCTION. The Goodyear Tire & Rubber Co., assignee of W. H. Campbell, both of Akron, O., U. S. A.

United Kingdom

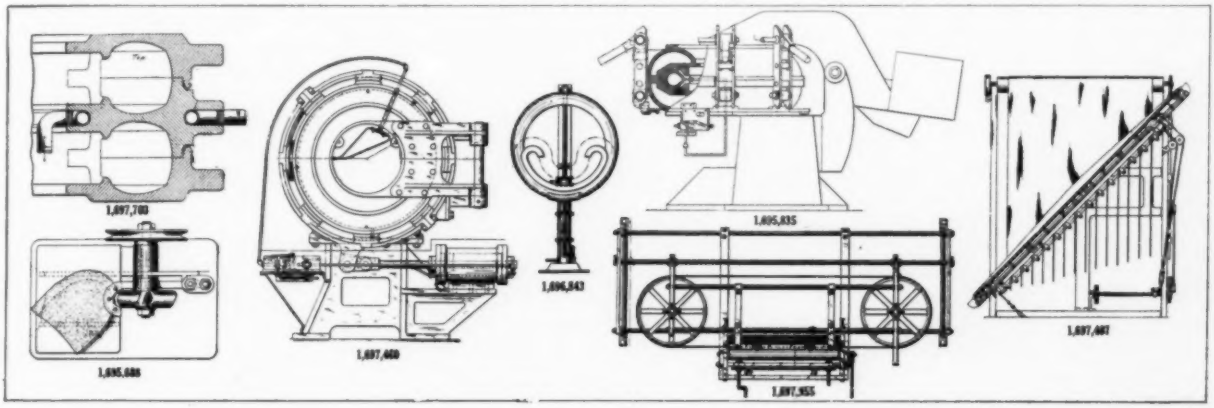
298,483† DRYING RUBBER. Anode Rubber Co., Ltd., 10, Lefebvre St., St. Peter's Port, Guernsey, assignees of A. Szegvari, University Club, Akron, O., U. S. A.

298,495† COMPRESSING AIR. A. Steurs, 24, Rue des Cailloux, Rixensart, Belgium.

298,596. BEARINGS. F. H. Banbury, Ansonia, Conn., U. S. A.

298,650† COATING RUBBER SURFACES. Anode Rubber Co., Ltd., 10, Lefebvre St., St. Peter's Port, Guernsey, assignees of G. F. Wilson, Akron, O., U. S. A.

298,836. STRIPPING TIRES FROM CORES. G. B. Ellis, 70, Chancery Lane, London, assignor to Goodyear Tire & Rubber Co., 1144 East Market St., Akron, O., U. S. A.



Rubber Patents, Trade Marks and Designs

299,005. VULCANIZING APPARATUS. Goodyear Tire & Rubber Co., 1144 East Market St., Akron, O., assignees of D. S. Harrington, 61 Flagler Ave., Atlanta, Ga., both in the U. S. A.

299,296† LINEAR DIMENSION GAGES. Magnetic Gauge Co., assignees of P. B. Schuster, both of Akron, O., U. S. A.

299,354† ELECTRIC METERS. Magnetic Gauge Co., Akron, assignees of R. D. Hickok, Cleveland, both in Ohio, U. S. A.

299,376† PACKING TIRES. Dunlop Rubber Co., Ltd., 32, Osnaburgh St., London, assignees of G. H. Karlsteen, Tonawanda, N. Y., U. S. A.

299,455† BOOTS. C. H. R. Collins, St. Albans, Curlewis St., Bondi, near Sydney, Australia.

299,463† ELECTRIC COUPLINGS. Anode Rubber Co., Ltd., 10, Lefebvre St., St. Peter's Port, Guernsey, assignees of C. L. Darby, Rome, N. Y., U. S. A.

299,647. VULCANIZING MOLDS. F. Krupp Grusonwerk Akt.-Ges., Buckau, Magdeburg, Germany.

299,713† ELECTROLYSIS. Anode Rubber Co., Ltd., 10, Lefebvre St., St. Peter's Port, Guernsey, assignees of C. L. Darby, Rome, N. Y., U. S. A.

299,904. TIRE REPAIR PATCHES. P. C. Oxborrow, 10A, New Rd., Southampton.

†Not yet accepted.

Germany

Designs

1,053,889. SPINNING AND WARPING MACHINE. Arthur Kaseberg, Im Holken 2, Barmen-Nachstebreck.

1,054,450. INNER TUBE ALARM. Automobilwerke H. Bussing A.G., Heinrich Bussing strasse 40, Braunschweig.

Process

United States

1,695,676. RECOVERY OF RUBBER. W. H. Yeandle, Torreon, Mex., assignor to Intercontinental Rubber Co., Wilmington, Del.

1,696,129. HEEL LININGS. M. S. Silver, Boston, Mass.

1,696,815. LEATHER FINISHING. A. Small, Danvers, Mass.

1,697,459. INFLATABLE TOYS. L. and I. Dorogi, both of Budapest, Hungary.

1,698,275. TREATING FILMS. C. Plaat, Cologne-Nippes, Germany.

United Kingdom

299,808† RUBBER LATEX. Aktiebolaget Separator, 8, Fleminggatan, Stockholm.

299,858† BOOTS. J. G. Borras, 22, Calle Oliver, Palma de Mallorca, Baleares, Spain.

Germany

469,954. PRODUCING FILTERS, DIAPHRAGMS AND SIFTERS. Dr. Hermann Beckmann, Albertinenstrasse 20, Berlin-Zehlendorf.

†Not yet accepted.

Chemical Patents

United States

1,695,636 to 1,695,642 inclusive. CHLORINATED RUBBER COMPOSITIONS. This group of seven patents relates to the preparation and application of cements or solutions in which chlorinated rubber is an essential feature.—Carleton Ellis, Montclair, N. J., assignor to Chadeloid Chemical Co., a corporation of W. Va.

1,695,643. ARTIFICIAL FIBER AND PROCESS. An artificial thread containing chlorinated rubber as an essential constituent of its composition.—Carleton Ellis, Montclair, N. J., assignor to Chadeloid Chemical Co., a corporation of W. Va.

1,696,409. VULCANIZING WITHOUT SULPHUR. A process for accelerating the vulcanization of rubber without sulphur in the presence of organic nitro compounds which comprises combining rubber with a nitro benzol and an element of the carbon group, and vulcanizing the rubber.—Iwan Ostromislensky, New York, N. Y., assignor to Revere Rubber Co., Chelsea, Mass.

1,697,236. PULLEY COVERINGS.—E. F. Gingras, Buffalo, N. Y.

1,697,275. COMPOSITE PRODUCT.—Harold Gray, assignor to The B. F. Goodrich Co., New York, N. Y.

1,698,569. ACCELERATOR. Phenylpiperidylguanidine.—W. P. ter Horst, assignor to The Rubber Service Laboratories Co., both of Akron, O.

Dominion of Canada

285,481. ANTI-SLIPPING COMPOUND. A solution made up of water, gluten, potassium chloride, liquid latex and formaldehyde.—John Talbot, Essex, Eng.

285,541. ANTIOXIDANT. Dinaphthyldiamine ethane.—The Goodyear Tire & Rubber Co., assignee of A. M. Clifford, both of Akron, O., U. S. A.

285,960. WATERPROOFING LEATHER. Impregnating leather with a firm solid at room temperature which contains from 10 to 50 per cent of rubber in molten paraffin wax, together with a resinous substance.—The Van Tassel Co., Boston, Mass., assignee of H. V. Dunham, Bainbridge, N. Y., U. S. A.

285,983. COMPOSITION FOR LEATHER.—H. V. Dunham, Bainbridge, N. Y., U. S. A.

286,103. ACCELERATOR. A reaction product of beta-hydroxy aromatic aldehyde and an aromatic amine.—The Goodyear Tire & Rubber Co., assignee of Jan Teppema, both of Akron, O.

286,105. ACCELERATOR. The reaction product of mercaptobenzoxazole and an amine.—The Goodyear Tire & Rubber Co., assignee of Jan Tappema, both of Akron, O., U. S. A.

United Kingdom

298,522. COMPOSITE TILES.—H. P. Stevens, 15 Borough High St., London.

298,537.† ALDEHYDE-AMINE CONDENSATION PRODUCTS.—Naugatuck Chemical Co., Naugatuck, Conn., assignees of S. M. Cadwell, 561 West 58th St., New York, N. Y., U. S. A.

298,622.† ACCELERATOR. Reaction product of a hydroxy aromatic aldehyde and an amine.—Goodyear Tire & Rubber Co., assignees of J. Teppema, both of Akron, O., U. S. A.

298,628.† LATEX TREATING. A reversable uncoagulated gel is formed by adding to latex a small quantity of a hydrosol of silicic acid.—Naugatuck Chemical Co., Naugatuck, Conn., assignees of J. McGavick, Passaic, N. J., both in U. S. A.

298,694. ELECTRIC INSULATION.—A. R. Kemp, Westwood, N. J., and Western Electric Co., Inc., 195 Broadway, New York, N. Y., U. S. A.

298,889.† SYNTHETIC CAOUTCHOUC.—J. Baer, 723 Greifenseestrasse, Uster, Switzerland.

298,939†. HYDROCARBON RESINS. — P. Krishnamurthy, Haldapara Road, Kalighat, Calcutta.

298,942.† ACCELERATOR. Mercaptoxazoles or their derivatives.—Goodyear Tire & Rubber Co., assignees of J. Tappema, both of Akron, O., U. S. A.

299,169. PRESERVING RUBBER.—B. D. Porritt, T. R. Dawson and Research Association of British Rubber & Tyre Mfrs., Croyden, Surrey.

299,542. PUNCTURE SEAL. W. C. P. Tanner, South Yarra, Victoria, Australia.

299,585. PRESERVING RUBBER. The aging properties of rubber are improved by adding latex serum and suitable alkali to the rubber mix before vulcanization.—Rubber Growers' Association, G. Martin and W. Davey, Imperial Institute, both in London.

299,737. MOLDING BY DIPPING.—Dunlop Rubber Co., Ltd., 32 Osnaburgh St., London.

299,738. ELECTRODEPOSITION OF RUBBER.—W. A. Williams, 1 Lennox St., Edinburgh.

† Not yet accepted.

General

United States

December 18, 1928*

1,695,745. HOSE PROTECTOR. G. E. Skinkle, Cleveland, O.

1,695,806. GOLF CLUB. P. E. Heller, New ark, N. J.

1,695,818. DUST CAP. E. G. Oakley, Southport, assignor to Bridgeport Brass Co., Bridgeport, both in Conn.

1,695,872. ANTIRATTLER. H. White, Jr., Buffalo, N. Y.

1,696,051. TIRE. L. Orszag and P. Curcuruto, Bronx, N. Y.

December 25, 1928*

1,696,201. PIVOTAL CONNECTION. H. C. Harris, Akron, O.

1,696,211. VALVE STEM. A. B. Preisser, Dallas, Tex.

1,696,314. BRAKE MECHANISM. K. E. Lyman, assignor to Bendix Brake Co., both of Chicago, Ill.

1,696,405. WHEEL. W. C. Martin, Chicago, assignor of one-fifth to J. H. Lee, Oak Park, both in Ill.

1,696,435. EXPANSION JOINT. C. A. Fraley, Belleville, N. J., assignor to Revere Rubber Co., Chelsea, Mass.

1,696,450. COLLAR BAND. H. W. Potts, San Francisco, Calif.

1,696,486. DENTAL IMPLEMENT. W. Jeffreys, East Orange, N. J.

1,696,503. TUBE AND TIRE SAVER. T. P. Roth, Louisville, Ky.

1,696,560. MEDICINE DROPPER. W. F. Ware, assignor to The Walter F. Ware Co., both of Haddonfield, N. J.

1,696,602. ENGINE MOUNTING. D. S. Harder and F. W. Vrooman, assignors to Durant Motor Co., all of Oakland, Calif.

1,696,691. NECKTIE. T. Rochman, New York, N. Y.

1,696,706. TOOTHBRUSH HOLDER. W. C. Athon, Lavoye, Wyo.

1,696,707. TIRE. D. N. Booth, New York, N. Y.

1,696,741. ELASTIC WHEEL. C. A. Van Bourgonie, Bergerhout-Antwerp, Belgium.

1,696,816. BRUSH ATTACHMENT. S. A. Steinarson, Bucksport, Me.

January 1, 1929*

1,696,903. TIRE PROTECTOR. A. E. Courtadon, Akron, O.

1,697,065. ELASTIC-CONNECTION REGULATOR. W. S. James, assignor to The Studebaker Corp., both of South Bend, Ind.

1,697,066. SPRING SHACKLE. W. S. James, assignor to The Studebaker Corp., both of South Bend, Ind.

1,697,219. BRAKE-OPERATING MEANS. W. J. Andres, South Bend, Ind., assignor to Bendix Brake Co., Chicago, Ill.

1,697,308. BALL. H. C. Ebert, Brooklyn, assignor to A. G. Spalding & Bros., New York, both in N. Y.

1,697,726. WASHING MACHINE. W. G. Haehl, Manila, Ind.

January 8, 1929*

1,697,871. VEHICLE CUSHION. A. J. Jansson, Hillside, N. J., assignor to International Motor Co., New York, N. Y.

1,697,892. HAT. R. Weil, assignor to Weil Clothing Co., both of St. Louis, Mo.

1,698,012. ATHLETIC GARMENT. G. W. Cruden, Freeport, assignor to A. G. Spalding & Bros., New York, both in N. Y.

1,698,017. SHOE TREAD. J. R. Gammeter, Akron, O.

1,698,070. BRASSIERE. I. Roth, Brooklyn, N. Y., assignor to Benjamin & Johnes, a corporation of New Jersey.

1,698,232. HARNESS AND COLLAR PAD. B. E. Katz, Norfolk, Nebr.

1,698,414. PNEUMATIC TIRE. J. F. Palmer, St. Joseph, Mich.

1,698,704. PORTABLE ELECTRIC CABLE. W. I. Middleton, Watertown, and C. R. Boggs, Waban, assignors to Simplex Wire & Cable Co., Boston, all in Mass.

*Under Rule No. 167 of the United States Patent Office, the issue closes weekly on Thursday, and the patents of that issue bear date as of the fourth Tuesday thereafter.

Dominion of Canada

December 11, 1928

285,412. WRAPPER. E. Blank, Eitorf/Sieg, Rhineland, Germany.

285,426. HOOK. H. G. Elliott, London, N. 3, England.

285,439. VACUUM CUP BRACKET. A. L. Herman, New York, N. Y., U. S. A.

December 25, 1928

285,881. CLUTCH PLATE. The Borg & Beck Co., assignee of H. V. Reed, both of Chicago, Ill., U. S. A.

Rubber Patents, Trade Marks and Designs

United Kingdom

December 5, 1928

298,431. DOOR STOPS. T. H. Davis, Rozel, Bois Hall Rd., Addlestone, Surrey.

298,457. PAVING BLOCKS. M. Holmes, 49, Deansgate, Manchester.

298,529. HAIR CURLING APPLIANCES. G. E. Bjorkman, 3, Rue Lécluse, Paris.

298,555† SHOCK ABSORBERS AND SPRINGS. R. B. Fageol, 405, West Adams St., Los Angeles, Calif., U. S. A.

298,632† FOOTARCH SUPPORTS. A. Frandsen, 1, Vintervej, Charlottenlund, Denmark.

298,643† GRAMOPHONE PICKUPS. H. Hallam, Vieux Moulin, Oise, and J. R. M. Hélary, 14, Rue de la Pepinière, Paris, both in France.

298,664. UNIVERSAL JOINTS. W. H. Dorman & Co., Ltd., 43, Foregate St., and R. L. Stafford, 151 Oxford Gardens, both in Stafford.

298,685. GRAMOPHONE PICKUPS. Columbia Graphophone Co., Ltd., 102, Clerkenwell Rd., and F. A. Mitchell, Bendon Valley, Garratt Lane, both in London.

298,718. BOOTS. A. and W. B. Looms, Bath Street Works, Market Harborough, Leicester.

298,756. TIRES. D. Thomas, 2, Montana Place, Landore, Swansea.

298,759. TENNIS BALLS. R. H. McHardy, The Halt, Sandy Lodge Way, Northwood, Hertfordshire.

December 12, 1928

298,783. GOLF-BALL CLEANERS. H. Evans, Ingleside, Lansdowne Ave., Slough, Buckinghamshire.

298,817. PNEUMATIC UPHOLSTERY. R. G. Ortiz, 1, Arganzuela St., Madrid.

298,865. STOPPERS. G. Vasseur, 27, Rue des Blagis, Bourg-la-Reine, Seine, France.

298,998. CYCLE SADDLES. A. V. Mellano, 6, Queen's Drive, Thames Ditton, Surrey.

299,053† WASHING MACHINES. Inventia Patent-Verwertungs-Ges., 10, Herrenacker, Schaffhausen, Switzerland.

299,111. STOPPERS. R. E. Gray, 29, Burmester Rd., Tooting, London.

299,158. ENDLESS-TRACK VEHICLES. L. A. Legros, 25, Cumberland Park, Acton, London.

December 19, 1928

299,205. BOOT AND SHOE ATTACHMENT. E. Peacock, Frankton Wood Cottages, Princethorpe, near Rugby.

299,244. GOLF TEES. H. H. Elder, Guarantee Title Bldg., Cleveland, O., U. S. A.

299,283. CLEANING APPLIANCES. C. H. Byford, 25, Havelock St., Ilford, London.

† Not yet accepted.

299,329† CONVEYERS. Bánská A Hutni Spolecnost, C.2, Jizdarenska, Brunn, and V. Hauer, Trinec, both in Czecho-Slovakia.

299,435† ELECTRIC OIL SWITCHES. British Thomson-Houston Co., Ltd., Crown House, Aldwych, London, assignees of C. W. Hewlett, 1770 Wendell Ave., Schenectady, N. Y., U. S. A.

299,457† BREATHING APPLIANCES. E. J. King, Galesburg, Ill., U. S. A.

299,458† VEHICLE WHEELS. P. Girard, 9, Rue President Carnot, Lyons, France.

299,525. STUFFING BOXES. G. H. Cook, of J. Walker & Co., Lion Works, Woking, Surrey.

299,534. LOADING COLLIERS. R. M. Thomas, Glasfryn, Forest Fach, Swansea.

December 28, 1928

299,657. CLEANING PIPES. A. Roerig, 62, Ottostrasse, Ehrenfeld, Cologne, Germany.

299,748. FOOTARCH SUPPORTS. C. J. Hobson, 6 Smithford St., Coventry.

299,759. FINGERCLEANING DEVICES. A Schwieger, 32, Burgermeister Finkstrasse, Hanover, Germany.

299,761† ELECTRIC CABLES. Felten & Guilleaume Carlswerk Akt.-Ges., Mülheim, Cologne, Germany.

299,762† SUBMARINE CABLES. Felten & Guilleaume Carlswerk Akt.-Ges., Mülheim, Cologne, Germany.

299,836† SCRAPER MATS. L. and R. Turover, 82, Avenue Philippe Auguste, Paris.

299,913. MASSAGE APPLIANCE. J. Koff, 96, Talbot Rd., Highgate, London.

Germany

469,533. BLOCK BELT. Rudolph Roderwald, Menzelstrasse 9, Berlin-Grunewald.

469,598. RACING GAME. Scandinavian Export Agency, A/S, Copenhagen, Denmark. Represented by Dr. F. Warschauer, Berlin S. E. 11.

469,678. FELLY. The Dunlop Rubber Co., Ltd. Represented by Dr. R. Wirth, C. Weihe, Dr. H. Weil, M. M. Wirth, Frankfurt a Main, and T. R. Koehnhorn, E. Noll, Berlin S. W. 11.

469,930. WOVEN ELASTIC SHEET. Wilhelm Weise, Roszplatzgasse 7, Gera.

469,998. FABRIC BELT. Rudolph Roderwald, Menzelstrasse 9, Berlin-Grunewald.

Designs

1,053,850. SANDAL. Harburger Gummiwaren-Fabrik Phoenix, A.G., Harburg, a. d. E.

1,053,941. PACKING WITH CORK CORE. Dr. Walter Boltze, Mellenbach.

1,054,123. TIRE WITH INSERT. Grahneis & Borner, Zipsendorf, Bez. Leipzig.

1,054,358. TIRE VALVE. Wilh. Marx, Hilden.

1,054,369. RUBBER MOTOR FOR TOYS. Arkady Jospe, Uhlandstrasse 10, Dresden.

Rubber Patents, Trade Marks and Designs

1,054,386. DIVIDED INNER TUBE. Johann Baptist Weber, Horbrotstrasse 2, and Ernst Bruckmann, Frickingerstrasse 7, Augsburg.

1,054,699. BATHING CAP. Firma M. Steinberg, Koln-Lindenthal.

1,054,831. HANDLE BAR. Firma Hermann Wruck, Friedrich List Strasse 4, Leipzig C 1.

1,054,940. COLOR APPLICATOR. Hermann Zocher, Rathausstrasse 2, Leipzig C. 1.

1,055,079. SOLE FOR ROPE SOCKS. Heinrich Iffland, Obersiemau i. Bavaria.

1,055,130. TOOTH BRUSH. Dr. Kurt Sendtner, Barenstein Bez. Chemnitz.

1,055,351. BATHING CAP. Continental Caoutchouc und Gutta-Percha Compagnie, Hannover.

Trade Marks

United States

Two Kinds of Trade Marks Now Being Registered

Under the rules of the United States Patent Office, trade marks registered under the Act of February 20, 1905, are, in general, fanciful and arbitrary marks, while those registered under the Act of March 19, 1920, Section (1) (b) are non-technical, that is, marks consisting of descriptive or geographical matter or mere surnames. To be registered under the later act, trade marks must have been used for not less than one year. Marks registered under this act are being published for the first time when registered, any opposition taking the form of an application for cancellation.

December 18, 1928

Act of February 20, 1905

250,903. Fancy representation and the word: "JUSKIDS"—children's shoes of leather, rubber, fabric, etc. Acme Shoe Mfg. Co., Chicago, Ill.

250,910. Fancy representation and the words: "JUNIOR ARMY"—shoes of leather, rubber, fabric, etc. Municipal Shoe Co., Inc., New York, N. Y.

250,975. HANDY ANNS FOR WOMEN'S HANDS—gloves of leather, rubber, fabric, etc. A. L. Cook, doing business as Great Northern Glove Co., Bluffton, Ind.

Act of March 19, 1920

251,005. DR. BIXLER—shoes of leather, rubber, fabric, etc. H. Childs & Co., Inc., Pittsburgh, Pa.

251,017. GOODWEAR—soles and heels. The Goodyear Tire & Rubber Co., Akron, O.

251,018. ARCH WELTS—shoes of leather, rubber and fabric. W. H. Tomlinson & Co., Bay City, Mich.

December 25, 1928

Act of February 20, 1905

251,086. Representation of an eagle and the word: "LONE"—raincoats. New York Mackintosh Clothing Co., New York, N. Y.

January 1, 1929

Act of February 20, 1905

251,179. Representation of a tall building and the words: "METROPOLITAN SHOES TOWER OVER ALL"—shoes of leather, rubber, fabric, etc. The Fair, Chicago, Ill.

251,207. Fancy design containing the words: "DURO-CURE." "HOOD," "PROCESS"—shoe soles. Hood Rubber Co., Watertown, Mass.

251,218. BALL BEARING HEEL SEAT—shoes of leather, fabric, rubber, etc. Shaft-Pierce Shoe Co., Faribault, Minn.

251,221. Fancy representation and the word: "STURDITREAD"—shoes of leather, rubber, fabric, etc. The Fair, Chicago, Ill.

251,230. Fancy design containing the words: "GLASER'S," "GOOD-GRIP," "COMBINATION," "FITS THE NARROW HEEL"—shoes of leather, rubber, fabric, etc. G. Glaser, doing business as Paramount Shoe Store, Scranton, Pa.

251,242. FOOT PALS—shoes of leather, rubber, fabric, etc. Wall-Streeter Shoe Co., North Adams, Mass.

251,250. Representation of an arrow containing the word: "ARROW"—boots, shoes and overshoes. Hood Rubber Co., Watertown, Mass.

251,320. XETAL—boots and shoes of leather, rubber, fabrics, etc. Safety Glass & Xetal Products, Ltd., Stapleford, England.

Act of March 19, 1920

251,374. NEVER-RIP—leather and rubber moccasins. The W. C. Russell Moccasin Co., Berlin, Wis.

January 8, 1929

Act of February 20, 1905

251,377. PARALASTIC—rubber rolls. American Wringer Co., Inc., Woonsocket, R. I.

251,383. FORD—tire repair kits, etc. Ford Motor Co., Fordson, Detroit, Mich.

251,473. Representation of a typewriter platen—typewriter platens. Rodic Rubber Co., Garwood, N. J.

251,643. "LAUREL"—druggists' sundries. Seiberling Latex Products Co., Akron and Barberton, O.

251,650. NYMPH—druggists' sundries. Seiberling Latex Products Co., Akron and Barberton, O.

Act of March 19, 1920

251,676. RAND—rubber sheeting. Rand Rubber Co., Inc., New York, N. Y.

251,705. BRAENDER—tires and tubes. Sterling Tire Corp., doing business as Hardwear Tire Corp., Rutherford, N. J.

Dominion of Canada

January 1, 1929

45,320. Word: "PERFEX"—waterproof and rainproof clothing. J. Weinberg & Sons (1927), Ltd., Aquarock Mills, North St., Cheetham, Manchester, England.

United Kingdom

December 5, 1928

492,605. NIGGA—rubber bands and patches and tire repairing rubber solution. The County Chemical Co., Ltd., Chemico Wks., Bradford St., Birmingham.

494,575—DURALRAIN—waterproof and rainproof overcoats. George Maclellan & Co., Ltd., Glasgow Rubber Works, Shuna St., Maryhill, Glasgow, Scotland.

495,174. DURATEST—machine belting. Hobdell, Way & Co., Ltd., 45 Church St., Minories, London, E. I.

496,004. SPRAYCO—insulated coverings for cables. James A. Jobling & Co., Ltd., 72 Grey St., Newcastle-upon-Tyne.

496,184. CARLSTON—waterproof garments. Carlston Mfg. and Clothing Co. (1928), Ltd., 154 Cheetham Hill Rd., Manchester.

December 12, 1928

491,236 and 491,237. LECITON—covered wire. The Liverpool Electric Cable Co., Ltd., Linacre Lane, Bootle, Liverpool.

492,166. TENTACULAR—machine belting. Henri Guillou & Co., 13 Rue Raymond, Montrouge, France (c/o Forrester, Ketley & Co., Jessel Chambers, 88-90 Chancery Lane, London, W. C. 2).

492,637. HERCULES—dressing for tires, belting, etc. Atlas Ago Chemische Fabrik Aktiengesellschaft, 16 Industriestrasse, Mölkau, near Leipzig, Germany (c/o S. Sokal, 1 Great James St., Bedford Row, London, W. C. 1).

493,508. AVON ARC—soles and heels. The Avon India Rubber Co., Ltd., Rubber Wks., Bath Rd., Melksham, Wiltshire.

494,461. RAVEN—all goods included in class 40. Redfern's Rubber Wks., Ltd., Dawson and Springbank Sts., Hyde, near Manchester.

December 19, 1928

495,771. USTAN—soles and heels. Dominion Rubber Co., Ltd., 420 Lagauchetiere St. West, Montreal, Quebec, Canada (c/o Haseltine, Lake & Co., 28 Southampton Bldgs., London, W. C. 2).

495,837 and 495,838. PERTITE—tire repair outfits. Vivian Caborn, trading as The Pertite Motor Accessory Co., 41 Hainault Ave., Westcliff-on-Sea.

December 26, 1928

493,946. EXPERT—rubber and gutta percha goods. Societe en Commandite par Action O. Englebert Fils & Cie, 3, 5, 7, 9 and 11 Rue des Vennes, Liege, Belgium (c/o Cope & Co., 65 Victoria St., London, S. W. 1).

494,069. DELAREINE—macintoshes. The Dela Rubber Co., Ltd., 2 Cambridge St., Manchester.

495,803. LAFLEX—shoe soles. United States Rubber Export Co., Ltd., 1790 Broadway, New York, N. Y., U. S. A. (c/o Haseltine, Lake & Co., 28 Southampton Bldgs., London, W. C. 2).

497,292. VACCAMAC—waterproof garments. P. B. Cow & Co., Ltd., 26 and 47 Cheapside, London, E. C. 3.

Designs

United States

77,234. TIRE. Term 14 years. L. W. Heefner, Greensburg, assignor to Pennsylvania Rubber Co., Jeannette, both in Pa.

77,235. TIRE. Term 14 years. H. C. Hower, Chicago, Ill.

77,271. TOY BALLOON. Term 7 years. J. C. Tyndall, St. Louis, Mo.

77,273 and 77,274. TIRE. Term 7 years. H. L. Venn, River Forest, assignor to Century Rubber Works, Cicero, both in Ill.

77,278. OVERSHOE. Term 3½ years. H. Westling, Watertown, assignor to Cambridge Rubber Co., Cambridge, both in Mass.

77,411. TIRE. Term 14 years. S. Holm, West Allis, Wis., assignor to The Fisk Rubber Co., Chicopee Falls, Mass.

77,440. TIRE. Term 14 years. W. Stephens, assignor to The Goodyear Tire & Rubber Co., both of Akron, O.

Dominion of Canada

8,132. TIRE. Dominion Rubber Co., Ltd., Montreal, Quebec.

RUBBER MARKET REVIEW
FOR 1928
THE NEW YORK RUBBER EXCHANGE

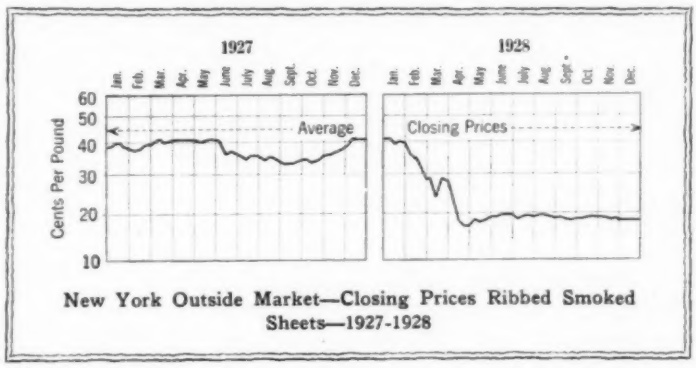
THE Rubber Exchange of New York in 1928, the third year of its existence, reported transactions which totaled 167,333 contracts or 426,365 tons, with an estimated value of $231,700,000. The price of seats on the exchange rose to $13,000 in April, the last sale of the year being $9,000.

In the January, 1928, market ribbed smoked sheets were 40.9 cents the first three days and until the middle of the month held above the 40 cent level. During the remainder of the month the price of January rubber held very closely under 40 cents with trading dull.

Transactions of the month were 8,858 contracts equivalent to 22,145 tons at 42.9 cents high to 38.2 cents low.

February market conditions were more active due to a liquidating movement which began January 26 sending active deliveries down 40 to 60 points. This was the start of a strong decline which carried the prices of all positions below 29 cents on February 21. The decline was accelerated by a London report that the British Government had asked the Civil Research Committee to investigate the operation of the Stevenson restriction act. The inference drawn from this was that it foreshowed the abandonment of restriction or that the so-called pivotal price was to be reduced to 15 pence, because the Civil Research Committee was known to be in sympathy with the British Board of Trade and the latter body was definitely opposed to the policy of restriction. The exports from British controlled estates for the second quarter of the restriction year remained at 60 per cent of standard production. February trading totalled 32,367 contracts or 80,917 tons at 40.2 cents high to 27.6 cents low.

March trading was somewhat more active than that in February due to the uncertainty regarding the outcome of the investigation then in progress by the British Civil Research Committee, and the losses occasioned by the drop in prices. These reached the then lowest level since 1924 when on March 12 ribs closed at 23.8 cents. A temporary turn of the tide of falling prices came March 19 on the news that the American buying organization, familiarly known as the "Pool," had negotiated a credit of $60,000,000, half of which was immediately available to support the pool's market operations. There was much excited trading as prices fell but at all times order prevailed in the trading and the Exchange functioned perfectly. March trading was 32,491 contracts or 81,227 tons at 29.8 cents high and 22.7 cents low.

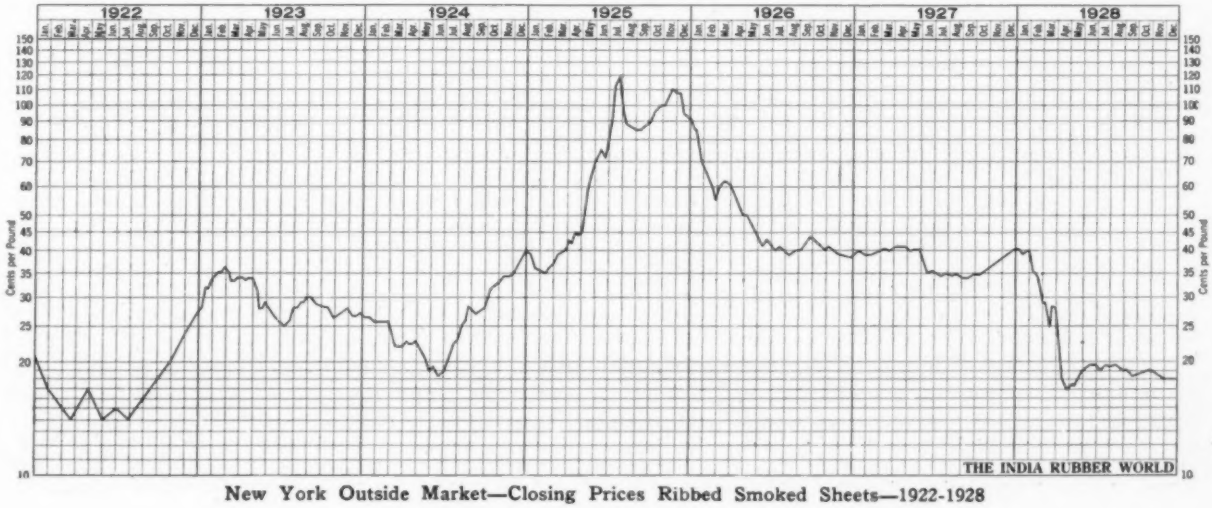


New York Outside Market—Closing Prices Ribbed Smoked Sheets—1927-1928

April trading totalled fewer transactions than in March although it included the most active sessions in the history of the Exchange. On April 4 official notice was given that the British Civil Research Committee recommended the removal of restriction November 1, 1928, on plantation rubber exports. This announcement took the market by surprise; sentiment instantly turned bearish and selling became so furious as to render almost impossible recording all sales individually. The market declined 6 cents and April rubber fell to 21 cents. Another drop of 3 cents came when the market reopened after the Easter recess. Thereafter price recession proceeded steadily and trading became dull due to lack of interest on the part of manufacturers. The lowest price of the year for ribbed smoked sheets was 16¾ cents on April 24. April transactions were 23,665 contracts, 59,162 tons at 27.7 cents high, 16.5 cents low.

In the May market factory and dealer absorption was in evidence and selling pressure at a minimum. Throughout the month a steady upward tendency was evident, May position advancing from 16.6 cents on May 1 to 19⅞ cents on May 29. At the latter level constant pressure stopped and consumers bought freely. May trading was 15,948 contracts, 39,875 tons at 20.3 cents high, 17.1 cents low.

In June the upward tendency of prices begun in May continued. June ribs reached 19.3 cents on June 19. This level was not long maintained nor again reached during the remainder of the year. On June 1, owing to the stability of the rubber market the Exchange reduced the trading limit on all future contracts from 8 to 5 cents.



New York Outside Market—Closing Prices Ribbed Smoked Sheets—1922-1928

The month's business on the Exchange was 8,706 contracts, 21,795 tons at 19.8 cents high and 18.5 cents low.

The July market opened with very little buying interest and prices made a downward movement. These conditions were shortly reversed, however, and the market tone improved as the statistical position steadily became more bullish, July ribs closing the month at 19⅜ cents, the same as at the opening.

The Exchange, by amendment of its by-laws, effective September 1, provided for a second contract to cover trading in six blanket and brown grades of hevea plantation rubber. This action increased the number of grades tenderable against exchange contracts so that they now include approximately 90 per cent of the entire world production of crude rubber. July business was 6,358 contracts, 15,895 tons at 19.6 cents high to 18.3 cents low.

August market prices were very steady for all positions. August ribs were practically at 19⅜ cents and futures ranged narrowly between that price and 20 cents. Buying interest was not active. August trading totalled 7,980 contracts, 19,950 tons at 19.8 cents high to 18.4 cents low.

September transactions declined in volume apparently reflecting the confidence of consumers that ample stocks of rubber would be forthcoming to meet all demands and the belief that prices would not materially increase during the fall months. Cable advices from Malaya indicated that about 65,000 tons of rubber would become available for export on removal of restriction on November 1, 1928. Trading was quiet during the entire month and nothing new transpired to influence the market either way. September ribs on the 4th of the month closed at 18¾ cents, promptly dropping 1 cent down from that level only to regain most of the lost ground at the end of the month when the same position closed at 18¼ cents. First latex maintained a premium over ribs of about 1 cent the entire month. Futures moved narrowly between 18 and 19 cents.

The principal world stocks (U. S. on hand and afloat, London, Singapore and Penang) at the end of September were estimated at 163,760 tons, which compares with a total of 237,075 tons at the end of December, 1927, or a decrease of 73,315 tons. September trading totalled 7,731 contracts, 19,327 tons at 19.0 cents high and 17.5 cents low.

The October market showed a sharp drop in volume of transactions from the preceding month. The hesitation to trade was attributable to uncertainty as to the immediate effect of the removal on November 1 of British export restriction. The spreads between high and low prices for futures were very narrow and there was no factory interest in them. Large trade interests absorbed the bulk of offerings which came principally from dealers. The prices of spot and all future positions were very close and varied during the month but slightly from their respective levels which ranged from 18 to 19 cents. On October 1 prices were 18.2 cents and on October 31 was 18.7 cents. October trade was 7,238 contracts, 18,095 tons at 19.4 cents high and 17.9 cents low.

November market operations showed a gain of nearly 40 per cent increase in volume over those in October and marked the reaction of the trade to the discontinuance of the Stevenson restriction plan. Early in the month dealers were waiting for news reports regarding shipping expectations from the far eastern markets. The removal of restrictions on November 1 was already discounted and had no effect on the market. There was a gain in steadiness as the month progressed but trade in futures was very limited. A depression in prices took place during the month amounting to a half a cent down from 18.6 cents on November 1. Transactions for the month were 10,343 contracts, 25,857 tons at 19.2 cents high and 17.4 cents low.

From December 1 to the close of the year the market was very steady with a slightly rising tendency of prices. Manufacturers showed interest only in opportunities in buying rubber cheap due to the possibility of continued heavy exports from the primary markets. The spread between high and low prices during the month on all future positions was extremely narrow. The same steadiness was evident in the price of ribs for December which on December 1 was 17.5 cents and on December 24, 17.9 cents.

December transactions amounted to 5,648 contracts, 14,120 tons at 19.3 cents high and 17.3 cents low.

New York Outside Market

The general conditions and course of the years trading in the outside market naturally followed very closely those on the Rubber Exchange. Reviewed by monthly periods the general market conditions were as follows:

January developed a mild interest on the part of consumers but in general the market ruled dull. Spot ribs opened at 41⅛ cents on January 1 and declined to 38⅝ cents on January 31.

In February factory buying diminished to the vanishing point waiting in vain for the bottom to be reached by the persistent decline of prices. The drop in spot closing prices ranged from 37⅝ cents on February 1 to 29⅛ cents on February 29.

March transactions were again very limited. The decline in spot prices continued unabated till the middle of the month at which time it was 23¾ cents. From this level it reacted to 26⅞ cents on March 31. Factories were well supplied with rubber for current needs and were waiting for definite news regarding the fate of the restriction scheme and the settling of prices to rock bottom.

Early in April the long period of expectancy was relieved by the official announcement of the cessation of restriction on exports to become effective November 1. A sharp break in prices followed, spot closing on April 1 at 26⅞ cents and on April 30, at 17¼ cents.

Buying activity was suspended as consumers viewed a rise in prices. The advance was attributed to active speculation in London and New York. Consumers had more or less stocks of high price rubber to be averaged down and were waiting for bottom prices to reappear before again entering the market. From 17¾ cents on May 1 spot advanced to 19⅛ cents on April 5, then easing off steadily to 18⅜ cents on May 19, and again advancing to 19½ cents on May 31.

The June market passed through steadily quiet conditions in which factory buyers' ideas ran consistently ¼ cent below sellers' prices. Spot ribs deviated but slightly either way from 19½ cents the entire month until the last four days when it was steady at 19 cents.

July witnessed a marked recession of stocks in the United States and London. This fact, contrary to expectation, did not stimulate any advance in prices for the remainder of the year which held constantly below the 20 cent level. The July market was very quiet with a perceptible upward trend carrying spot ribs from 18⅝ cents on July 1 to 19¼ cents on July 31.

The August market opened steady and strong with some advance in price and fair buying interest. After the first week quiet conditions prevailed. Spot ribs were practically unchanged from 19⅜ cents for the first three weeks. For the last week of the month, however, spot was practically one-half cent lower, closing on August 31 at 18¾ cents.

September showed little interest on the part of manufacturers to buy rubber. They were correct in their belief that the price levels prevailing would continue for a reasonable length of time and they discounted the ending of restriction on November 1.

In the October market consumers' interest in purchasing rubber was at low ebb. They were planning to keep their stocks low on all supplies in view of the approaching year end inventory season in expectation that the removal of restriction will result in still lower prices for crude. It was the general opinion that the surplus of rubber to be released after November 1 will just about restore to normal the present reduced London and United States stocks. Also that the increased car production scheduled for 1929 will readily absorb the surplus offerings of crude rubber and maintain the price level. The price of spot ribs ranged between 18 and 19 cents for the month, being on October 1 at 18¼ cents and at 18¾ cents on October 31.

November market conditions were substantially a continuation of those in October. Manufacturers bought for current needs only and waited for lower prices. Their views, however, were not shared by dealers because of the fact that current prices and credit conditions favored holding rubber to sustain prices. The trend of November spot prices was downward, the level on November 1 was 18⅝ cents and on November 30 it was 17⅝ cents.

The December outside market showed continuation of the conditions that prevailed for many weeks preceding. Factory consuming interests realized the cheapness of rubber yet felt no incentive to purchase it. All interests were apparently agreed that the 1929 outlook is encouraging for the rubber manufacturing industry. Spot ribs varied only ¾ cents the entire month, closing on December 1 at 17⅝ cents and on December 31 at 18⅛ cents.

The market strength was due to the operation of the law of supply and demand since the removal of restriction.

New York Outside Market—Low and High Spot Rubber Prices—1920-1928

Prices in Cents Per Pound

		January	February	March	April	May	June	July	August	September	October	November	December
1920.	First latex crepe	51 @ 55¼	45¼ @ 51½	46 @ 48¼	42½ @ 46½	38 @ 43	37½ @ 39	30 @ 35¼	29½ @ 33½	24½ @ 29	21 @ 26	18½ @ 21	16¼ @ 19½
	Ribbed smoked sheets	51 @ 55	45 @ 56½	46 @ 48	42½ @ 45	38 @ 43	37¼ @ 39	29½ @ 35	29½ @ 33¾	23½ @ 28¾	20 @ 24	17½ @ 19	16 @ 18½
	Upriver fine	45 @ 50	42½ @ 45	41¼ @ 43	40½ @ 42	29 @ 41¼	36¾ @ 38½	34½ @ 35¼	30 @ 35	26 @ 30	23¼ @ 26	20½ @ 23	18 @ 20½
	Upriver coarse	34 @ 37	31½ @ 34	31½ @ 31¾	30 @ 32	29½ @ 30½	27½ @ 28¾	22 @ 32	20 @ 27	16½ @ 21	15 @ 16½	14¼ @ 15½	14 @ 15
1921.	First latex crepe	19 @ 21¾	19½ @ 20	18 @ 19½	16¾ @ 17¾	15½ @ 17½	13½ @ 14¾	14 @ 17	14¼ @ 17	14 @ 16	14 @ 17	16 @ 19¼	18 @ 21¼
	Ribbed smoked sheets	18 @ 20½	17½ @ 18	16¾ @ 18	16½ @ 18	15½ @ 18¾	11½ @ 13¾	11¼ @ 15½	13¼ @ 15	13¾ @ 15¾	14¾ @ 17	16 @ 19¼	18¾ @ 24
	Upriver fine	18 @ 19½	17 @ 17½	11¾ @ 12	09 @ 10½	08¾ @ 09½	07½ @ 09	07½ @ 09	08¾ @ 11½	9½ @ 11½	11¾ @ 12	12 @ 15	14 @ 15½
	Upriver coarse	13 @ 17	13¼ @ 14										
1922.	First latex crepe	15¾ @ 21	14 @ 16¾	13¾ @ 15	14¾ @ 16¾	14¾ @ 16¾	14½ @ 16¼	14½ @ 15¾	13¾ @ 14¾	13¾ @ 15¼	13¾ @ 23¾	22¾ @ 26	26¾ @ 28¼
	Ribbed smoked sheets	15½ @ 21¼	14¾ @ 16¾	13 @ 15¾	14¾ @ 16¾	14¾ @ 16¾	14¾ @ 16¾	14½ @ 15¾	13¾ @ 14¾	13¾ @ 15¾	13½ @ 22¾	23¾ @ 25	26¾ @ 28¾
	Upriver fine	17¾ @ 23	16¾ @ 18½	17 @ 17¾	17¾ @ 19¾	18 @ 18¾	18 @ 18¾	18 @ 20	18½ @ 19½	18½ @ 19	18½ @ 24	23¾ @ 25	25¾ @ 25¾
	Upriver coarse	12¾ @ 18	12 @ 13¼	12 @ 13	12½ @ 14	12¾ @ 13¾	13 @ 14	12¾ @ 14	13 @ 14	13½ @ 14	15¾ @ 19	17 @ 20	17 @ 18½
1923.	First latex crepe	28½ @ 37¾	33¾ @ 36½	33½ @ 35½	31½ @ 36¾	26½ @ 31¾	24¾ @ 29¾	24¾ @ 28¾	27½ @ 30½	28½ @ 30¾	26¼ @ 28½	27½ @ 28½	27½ @ 28¾
	Ribbed smoked sheets	28½ @ 37¾	33¾ @ 36¾	33½ @ 35½	31 @ 36¼	26 @ 31¾	24¾ @ 29¼	24¾ @ 28¾	27½ @ 30¾	28¾ @ 29¾	25¾ @ 28½	26¾ @ 28¾	28¾ @ 29¾
	Upriver fine	24½ @ 36	33 @ 36	32 @ 34	28½ @ 30¾	26 @ 28	26¾ @ 28¾	26¾ @ 28½	26¼ @ 28¾	26¾ @ 28½	22 @ 26¼	21¾ @ 26¾	23¾ @ 25¾
	Upriver coarse	18½ @ 28¾	25 @ 28	26½ @ 28½	26½ @ 28½	21¼ @ 25½	22¾ @ 25	22¾ @ 23	23 @ 24½	22 @ 24½	18 @ 22¾	17¾ @ 19¾	19 @ 19
1924.	First latex crepe	24¾ @ 27	25 @ 26½	20¾ @ 25½	22⅝ @ 24	18 @ 23½	19¾ @ 21	19¾ @ 23½	23½ @ 28¾	27 @ 28¾	29 @ 33½	33½ @ 35	35⅝ @ 39¾
	Ribbed smoked sheets	24¾ @ 27	25 @ 26	20½ @ 24¾	22 @ 23½	18¾ @ 22¾	18¾ @ 19¾	18¾ @ 23½	24⅜ @ 27¾	26¼ @ 28	28½ @ 32½	33½ @ 35	35⅝ @ 39¾
	Upriver fine	21 @ 23¾	19 @ 20½	18¾ @ 20½	19 @ 21	18¼ @ 21½	20 @ 21	20 @ 22¾	23¼ @ 26½	27 @ 30	28¾ @ 32½	33½ @ 34	31½ @ 33
	Upriver coarse	17¾ @ 18½	17 @ 17¾	15¾ @ 17¾	16 @ 17½	13¾ @ 16½	13¼ @ 14	12½ @ 15¾	15 @ 17½	16¼ @ 17½	18¾ @ 23	22 @ 24	23½ @ 29
1925.	First latex crepe	34¾ @ 39	38⅝ @ 44½	41¼ @ 46¾	44¾ @ 69½	69 @ 85	78 @ 1.22	71 @ 99	80 @ 96	92 @ 1.03½	99 @ 1.14		
	Ribbed smoked sheets	34¾ @ 39½	38¾ @ 43¾	41¼ @ 46	44¾ @ 70	70 @ 87	81 @ 1.23	79 @ 95	92 @ 1.02½	98 @ 1.13			
	Upriver fine	33 @ 37	31½ @ 37	36 @ 37½	37¾ @ 57	52 @ 78	76 @ 1.13½	68 @ 75	69 @ 93	89 @ 1.03			
	Upriver coarse	26¼ @ 29½	25¾ @ 26¾	29¼ @ 30	31½ @ 45	41 @ 62½	60 @ 74	46 @ 63	45 @ 49½	60 @ 76			
1926.	First latex crepe	71 @ 92½	57 @ 70	53½ @ 64	47½ @ 60	47 @ 50½	41½ @ 45	40¾ @ 44½	35 @ 41	40¾ @ 42½	42¼ @ 43¾	38¾ @ 42	36¾ @ 39
	Ribbed smoked sheets	70 @ 91	55½ @ 69	52¾ @ 63	46½ @ 59½	47 @ 50½	41½ @ 45	40⅝ @ 44½	36¾ @ 41	42½ @ 43	38 @ 39	32½ @ 38	31 @ 33
	Upriver fine	62 @ 83	48 @ 63	44 @ 59½	41 @ 53¾	38 @ 43	34 @ 37	32 @ 39½	33 @ 40	38 @ 40	28 @ 30	22 @ 28	21 @ 23
	Upriver coarse	38 @ 64	30 @ 50	35 @ 45	30 @ 38	24½ @ 30½	20 @ 24½	23 @ 25¼	21 @ 24½	26½ @ 27	28 @ 30	22 @ 28	23 @ 29
1927.	First latex crepe	38 @ 41½	37½ @ 40¾	40 @ 42¾	40¾ @ 41¾	41 @ 41¾	35¾ @ 41	34½ @ 35¾	34¼ @ 36¾	33 @ 35½	33½ @ 35½	35¾ @ 41¾	39¾ @ 41¾
	Ribbed smoked sheet	37¾ @ 41¾	39½ @ 42¾	40 @ 42¾	40½ @ 41½	40½ @ 41¾	34¾ @ 35¾	34¾ @ 36¼	33 @ 35½	33 @ 35¾	35⅝ @ 41¾	39¾ @ 41¾	39¾ @ 41¾
	Upriver fine	29 @ 34¾	27¾ @ 32	32 @ 35	32¼ @ 33	32¼ @ 37	30 @ 37	30 @ 30¾	27 @ 28¾	28¼ @ 30	28¾ @ 35½	30½ @ 35	30½ @ 35
	Upriver coarse	22 @ 25	20½ @ 25	25 @ 27¾	24½ @ 26¾	23¾ @ 26¾	20 @ 25	19½ @ 21	19½ @ 20¾	19 @ 20	19 @ 22¾	21¾ @ 28	24¾ @ 27¾
1928.	First latex crepe	38¾ @ 41¾	28½ @ 38¾	24¼ @ 29¾	17 @ 27¾	17½ @ 20¾	19½ @ 20	19 @ 20½	19½ @ 20	18½ @ 19¾	19 @ 20¼	18⅝ @ 19¾	18¾ @ 19
	Ribbed smoked sheet	38¾ @ 41¾	28½ @ 38	24 @ 29¾	16¾ @ 27½	17½ @ 20¾	19⅛ @ 19⅝	18¾ @ 20	19⅛ @ 20	17¾ @ 19	18¾ @ 19¾	17⅝ @ 18⅝	18⅛ @ 18⅝
	Upriver fine	29¼ @ 33½	24 @ 29	21¾ @ 25¾	16¾ @ 24	20 @ 23½	21¾ @ 23	20½ @ 21	21¾ @ 23	18¾ @ 21	19 @ 21½	19¼ @ 20½	20 @ 20½
	Upriver coarse	24 @ 26¾	18¾ @ 24½	16¾ @ 21	13¾ @ 17	14¼ @ 16	13¾ @ 15	13¾ @ 15½	12¾ @ 14	13½ @ 14½	13¾ @ 14½	13¾ @ 14½	14½ @ 14½

Production and Consumption for 1929

The London brokerage firm of Lewis & Peat estimate 1929 rubber production and consumption as follows:

	Consumption Long Tons		Production Long Tons
United States	430,000	Malaya	335,000
Canada	33,000	Ceylon	60,000
United Kingdom	55,000	Netherland East Indies	235,000
Germany & Central Europe	35,000	India & Burma	10,000
Russia	18,000	British Borneo	18,000
France	40,000	Indo-China & Siam	10,000
Italy	13,000	Brazil and Wild	22,000
Norway, Sweden & Denmark	6,000		
Belgium and Netherlands	6,000	Total	690,000
Australia	14,000		
Japan	25,000		
Other countries	5,000		
Total	680,000		

Ceylon Rubber Exports

January 1 to October 31, 1928

	Tons
To United Kingdom	9,493.33
Continent	3,553.99
Australia	883.12
America	26,939.11
Egypt	12.00
Africa	21.99
India	21.77
Japan	100.99
Other countries in Asia	6.60
Total	41,032.90
For the same period last year	46,838.19

Annual Exports, 1921-1927

	Tons
For the year 1927	55,355.77
1926	58,799.56
1925	45,697.19
1924	37,351.13
1923	37,111.88
1922	47,367.14
1921	40,210.31

Plantation Rubber Exports from Malaya*

January 1 to November 30, 1928

	From Singapore Tons	From Penang Tons	From Malacca Tons
To United Kingdom	4,827.69	6,880.91	6,987.30
British Possessions	2,856.77	237.00	290.00
Continent of Europe	10,841.80	2,043.67	3,128.11
United States	137,866.35	28,484.49	11,508.09
Japan	17,557.00	2,405.50	1,584.00
Other countries	367.83	.....	.....
Totals	174,317.44	40,051.57	23,497.50

*Excluding all foreign transhipment.

American Consumption

An estimate made by Eric Miller states that the surplus stocks available after Nov. 1 would be only about 50,000 tons. This is equal to little more than the reduction in London stocks during the past twelve months. The London "Statist" mentions the possibility of overspeculation threatening United States prosperity and causing a reaction in rubber consumption, and says: "It is a striking fact that on the eve of the removal of restriction many rubber shares improved in price and the tone of the market generally was more confident. Where uncertainty lies is in the matter of the future of American consumption."

Rubber Seeds

A new source of revenue for rubber estates is the collecting of seeds from which oil is extracted, these seeds having heretofore been treated as refuse on Malayan rubber tree estates. It is said that estate laborers can earn about three cents a day in their spare time collecting the seeds and the market price of twenty-two dollars a ton (Straits currency) gives the estate a net profit of eleven dollars and forty cents.

United States Statistics

IMPORTS OF CRUDE AND MANUFACTURED RUBBER

	October, 1928		Ten Months Ended October, 1928	
	Pounds	Value	Pounds	Value
UNMANUFACTURED—*Free*				
Crude rubber	98,688,802	$18,200,332	798,546,617	$212,329,564
Balata	270,138	59,358	1,320,029	331,425
Jelutong or Pontianak	960,995	129,065	14,691,372	2,243,789
Gutta percha	534,562	94,570	3,056,063	681,803
Guayule	.....	.....	6,891,719	1,755,685
Rubber scrap	2,359,612	45,135	17,050,274	565,811
Totals	102,814,109	$18,528,460	841,556,074	$217,908,077
Chicle *dutiable*	592,762	$299,078	10,135,283	$5,169,918
MANUFACTURED—*Dutiable*				
Rubber belting	40,705	$22,299	442,367	$249,957
Rubber tires	90	1,043	4,192	67,922
Other manufactures of rubber	.....	142,608	.....	1,347,633
Totals	40,795	$165,950	446,559	$1,665,512

EXPORTS OF FOREIGN MERCHANDISE

RUBBER MANUFACTURES				
Crude rubber	5,386,149	$1,085,407	59,678,308	$15,759,688
Balata	18,006	5,583	252,883	96,122
Gutta percha, rubber substitutes and scrap	4,433	679	140,957	17,916
Rubber manufactures	.....	1,964	.....	325,333
Totals	5,408,588	$1,093,633	60,072,148	$16,199,059

EXPORTS OF DOMESTIC MERCHANDISE

MANUFACTURED				
Reclaimed	1,883,276	$141,345	18,309,087	$1,416,661
Scrap and old	3,544,426	151,208	36,773,156	1,919,693
Rubberized piece goods and hospital sheeting *sq. yd.*	127,493	58,646	1,502,697	732,606
Footwear				
Boots *pairs*	158,821	338,486	994,598	2,285,250
Shoes *pairs*	426,590	557,326	2,184,556	2,371,745
Canvas shoes with rubber soles *pairs*	441,541	268,467	4,425,511	3,068,987
Rubber water bottles and fountain syringes *number*	31,761	21,125	295,833	188,504
Rubber gloves *doz. pairs*	8,784	27,010	79,919	229,923
Other druggists' rubber sundries	.....	43,858	.....	352,798
Rubber balloons *gross*	54,327	68,235	475,986	583,863
Rubber toys and balls	.....	18,473	.....	166,338
Bathing caps *doz.*	5,510	12,274	156,703	361,841
Hard rubber goods				
Electrical hard rubber goods	151,482	25,333	1,288,949	259,480
Others	176,002	31,662	1,569,046	349,901
Tires				
Casings, auto *number*	246,418	2,837,651	2,017,143	25,164,775
Tubes, auto *number*	160,178	339,339	1,339,980	2,872,444
Other casings and tubes *number*	6,066	15,424	46,873	104,763
Solid tires for automobiles and motor trucks *number*	7,384	164,486	48,745	1,573,880
Others	176,002	31,662	1,569,046	349,901
Tire accessories	.....	133,629	.....	1,374,680
Rubber and friction tape	160,894	49,923	1,314,516	395,948
Belting	485,608	283,245	4,060,150	2,325,443
Hose	798,047	276,094	6,150,260	2,224,217
Packing	185,818	86,733	2,206,341	1,005,688
Soles and heels	107,537	102,460	1,151,697	1,582,647
Thread	130,926	143,475	1,327,509	1,457,304
Rubber bands and erasers	86,352	56,777	751,653	501,505
Other rubber manufactures	.....	241,616	.....	2,132,815
Totals	.....	$6,522,796	.....	$57,285,226

Crude Rubber Imports by Customs Districts

	*November, 1928		Eleven Months Ended *November, 1928	
	Pounds	Value	Pounds	Value
Massachusetts	2,819,386	$500,575	36,219,790	$9,555,692
Buffalo	.....	.....	12,060	2,290
New York	61,166,340	11,253,510	747,207,504	191,300,343
Philadelphia	1,669,182	276,304	23,777,126	7,701,415
Maryland	9,982,953	1,785,586	32,727,619	8,641,855
Los Angeles	6,159,498	1,067,541	34,527,895	8,305,305
San Francisco	101,087	24,828	1,193,645	315,481
Oregon	33,600	6,163	150,335	41,731
Michigan	.....	.....	33,600	10,080
Ohio	105,280	19,880	3,031,674	950,726
St. Louis	.....	.....	280,000	110,749
Wisconsin	.....	.....	56,000	21,982
Colorado	.....	.....	882,320	197,902
Totals	82,037,326	$14,934,387	880,099,568	$227,155,551

*Including latex dry rubber content.

Rubber Estimates

Estimates of rubber production and consumption made by the Netherland planter, J. N. Burger, are as follows: 1928 production, 660,000 long tons, consumption 660,000 long tons; 1929 production, 700,000 long tons, consumption 712,000 long tons.

United Kingdom Statistics

IMPORTS

	November, 1928		Eleven Months Ended November, 1928	
UNMANUFACTURED	Pounds	Value	Pounds	Value
Crude Rubber From—				
Straits Settlements	4,749,200	£170,642	78,351,600	£3,730,207
Federated Malay States	1,369,300	49,349	37,779,000	1,799,547
British India	666,200	25,932	11,634,509	607,310
Ceylon and Dependencies	1,470,800	54,507	26,043,800	1,276,848
Other Dutch possessions in Indian Seas	874,000	33,090	20,732,000	1,045,398
Dutch East Indies (except other Dutch possession in Indian Seas)	2,078,900	77,114	23,901,200	1,180,887
Other countries in East Indies and Pacific not elsewhere specified	124,100	4,480	2,884,800	140,677
Brazil	441,200	16,782	4,480,100	212,404
South and Central America (except Brazil)	59,100	2,226	285,300	13,658
West Africa				
French West Africa	.....	.....	106,000	4,358
Gold Coast	33,900	1,272	471,000	22,704
Other parts of West Africa	164,800	6,117	1,894,000	85,099
East Africa, including Madagascar	58,300	2,080	1,164,800	56,442
Other countries	56,000	2,234	1,434,900	68,324
Totals	12,145,800	£445,825	211,163,000	£10,243,863
Gutta percha and balata	351,500	26,919	3,030,800	249,157
Waste and reclaimed rubber	865,000	7,401	8,280,100	101,687
Rubber substitutes	11,900	254	43,700	1,215
Totals	13,374,200	£480,399	222,517,600	£10,595,922
MANUFACTURED				
*†‡Tires and tubes				
Pneumatic				
Outer covers	.....	£43,967	.....	£702,182
Inner tubes	.....	7,990	.....	136,135
Solid tires	.....	13,201	.....	82,006
Boots and shoes *doz. pairs*	35,692	133,056	728,148	1,528,119
Other rubber manufactures	.....	141,667	.....	1,613,974
Totals	.....	£339,881	.....	£4,062,416

EXPORTS

UNMANUFACTURED				
Waste and reclaimed rubber	3,271,300	£21,945	29,645,900	£219,373
Rubber substitutes	42,300	1,011	517,400	12,405
Totals	3,313,600	£22,956	30,163,300	£231,778
MANUFACTURED				
‡Tires and tubes				
Pneumatic				
Outer covers	.....	£295,371	.....	£2,501,740
Inner tubes	.....	61,862	.....	461,529
Solid tires	.....	19,032	.....	211,319
Boots and shoes *doz. pairs*	18,324	36,451	246,775	410,419
Other rubber manufactures	.....	240,759	.....	2,771,108
Totals	.....	£653,475	.....	£6,356,115

EXPORTS—COLONIAL AND FOREIGN

UNMANUFACTURED				
Crude Rubber To—				
Russia	.....	.....	7,424,400	£491,931
Sweden, Norway and Denmark	320,300	£16,334	3,009,100	180,344
Germany	3,603,900	137,539	34,833,600	1,871,222
Belgium	1,164,600	48,399	8,895,800	480,336
France	5,417,200	203,379	35,443,800	1,754,729
Spain	95,000	5,207	1,773,200	113,785
Italy	1,041,900	39,257	15,070,200	759,226
Other European countries	634,000	28,750	4,575,900	294,519
United States	6,261,800	253,887	106,564,500	5,973,757
Canada	56,100	2,111	127,200	5,217
Other countries	85,900	4,741	1,490,700	106,591
Totals	19,180,700	£739,604	219,208,400	£12,031,657
Gutta percha and balata	71,100	4,955	762,600	56,598
Waste and reclaimed rubber	1,900	53	224,100	4,551
Rubber substitutes	1,100	55	5,600	267
Totals	19,254,800	£744,667	220,200,700	£12,093,073
MANUFACTURED				
*‡Tires and tubes				
Pneumatic				
Outer covers	.....	£10,527	.....	£143,779
Inner tubes	.....	1,357	.....	29,200
Solid tires	.....	919	.....	4,262
Boots and shoes *doz. pairs*	975	2,908	12,300	24,325
Other rubber manufactures	.....	9,280	.....	119,123
Totals	.....	£24,991	.....	£320,689

* After April 12, 1927, tires and tubes imported or exported with complete vehicles or chassis, or fitted to wheels imported separately, are included under complete vehicles or parts.

† Motor cars, motorcycles, parts and accessories, liable to duty from Sept. 29, 1915, until Aug. 1, 1924, inclusive, and after July 1, 1925. Commercial vehicles, parts and accessories were exempt from duty until Apr. 30, 1926, inclusive, and rubber tires and tubes until Apr. 11, 1927, inclusive.

‡ Tires and tubes included prior to Apr. 12, 1927.

MARKET REVIEWS

Crude Rubber

New York Exchange

TRANSACTIONS on the Rubber Exchange from December 24, 1928, to January 26, 1929, inclusive, were 26,047 lots, equivalent to 65,118 tons, compared with 14,872.5 tons done from November 26 to December 22, 1928. This was an increase of 20,246 tons or nearly 145 per cent. Summarized by weekly periods the course of the market was as follows:

During the week ended December 29, trading was characterized by pre-holiday lack of general interest. Prices showed an advancing tendency. The week closed with futures on a firm basis and active dealer interest. Manufacturers were out of the market.

The contracts sold amounted to 2,435 tons. On December 29, spot ribs on A contracts closed at 18.2 cents nominal, BB contract blanket crepe, at 17.50 cents nominal. A contract futures closed as follows: January, 18.10 cents; March, 18.30 cents; May, 18.50 cents; July, 18.90 cents; September, 19.10 cents; October, 19.30 cents; November, 19.40 cents.

The market closed January 5 was quiet and featureless owing to the holidays and very little price movement. The effect of heavy shipments from the far eastern markets was not fully manifest. Sudden speculative buying made its appearance about midweek. The week closed with a good demand and much speculative buying.

The contracts sold amounted to 1,852½ tons. On January 5 spot ribs on A contracts closed at 18.10 cents, BB contract blanket crepe at 17.40 cents. A contract futures closed as follows: January, 17.90 cents; March, 18.20 cents; May, 18.60 cents; July, 18.90 cents; September, 19.10 cents; October, 19.20 cents; December, 19.40 cents.

During the week terminated January 12 the market was very bullish, business was active and prices moved upwards steadily. On Friday transactions reached the record figures of 3,887 lots equivalent to 9,717½ tons or 832½ tons more than the former record sales on April 4, 1928. The tremendous volume of dealer and commission support was increased considerably by a broad participation by European buyers, general public demand and speculative buying.

Contracts sold for the week amounted to 32,850 tons. On January 12 spot ribs on A contracts closed at 21.30 cents, BB contract blanket crepe, 20.30 cents. A contract futures closed as follows: January, 21.00 cents; March, 21.10 cents; May, 21.50 cents; July, 21.90 cents; September, 22.10 cents; October, 22.20 cents; November and December, 22.30 cents.

The market of the week terminated January 19 began in great excitement on Monday, very active and prices declining. Strong selling pressure developed by midweek. Business on Wednesday totaled 869 contracts or 6,605 tons. The rest of the week futures continued to sell off and the week closed with trade very quiet and prices barely steady.

The contracts sold for the week totaled 25,987½ tons. On January 19 spot ribs on A contracts closed at 20.20 cents; BB contract blanket crepe 18.60 cents. A contract futures closed as follows: January, 19.90 cents; March, 20.10 cents; May, 20.60 cents; July, 20.80 cents; September, 20.90 cents; October, 21.00 cents; November, 21.30 cents; December, 21.30 cents.

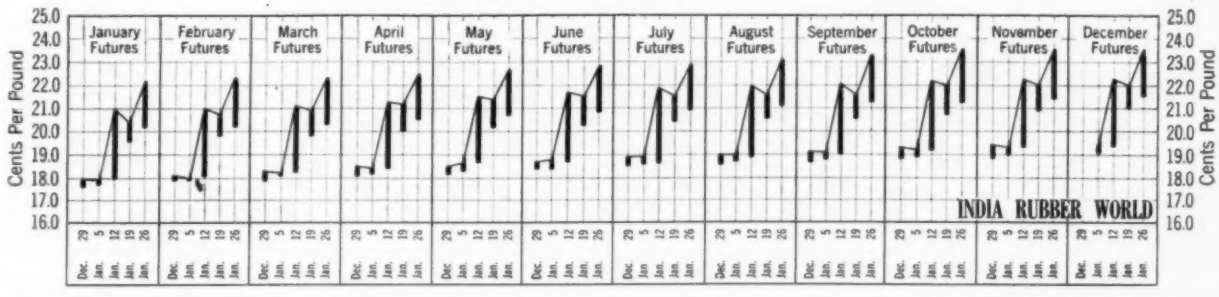
Trading during the week ended January 26 was marked by prices advancing in active trading in sympathy with the volume of speculation in London. The rise in values gained strength as the week progressed. On Thursday all of the nine active deliveries at one time showed gains of more than a cent over the previous finals. The late 1929 positions passed the 23½ cent level.

Contracts sold amounted to 71,310 tons. Spot ribs on A contracts closed January 26 at 20.2 cents; BB blanket crepe at 18.6 cents. A contract futures closed all nominal as follows: February 22.0 cents; April 22.3 cents; June 22.6 cents; August 22.9 cents; October 23.1 cents; December 23.4 cents.

New York Outside Market

Factories were confining their purchases the past month mostly to hand-to-mouth needs looking for a drop in prices. This applies particularly to those who missed

New York Rubber Exchange—High and Low Monthly Futures



The Rubber Exchange of New York, Inc.

DAILY MARKET FUTURES—RIBBED SMOKED SHEETS—CLOSING PRICES—CENTS PER POUND—"A" CONTRACTS

Positions	December, 1928							January, 1929																				
1928	24	25*	26	27	28	29	31	1*	2	3	4	5	7	8	9	10	11	12	14	15	16	17	18	19	21	22	23	24	25	26
Dec.	17.9	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
1929																														
Jan.	17.6	....	17.6	17.7	17.8	18.0	17.8	....	17.7	17.7	17.8	17.9	18.0	18.1	18.3	18.4	19.8	21.0	20.0	19.6	20.4	20.1	20.0	19.9	20.2	20.3	21.1	22.2	....	....
Feb.	17.8	....	17.8	17.8	17.9	18.1	18.0	....	17.9	17.9	18.0	18.0	18.1	18.2	18.3	18.4	19.8	21.0	20.1	19.8	20.7	20.1	20.0	20.0	20.2	20.4	21.2	22.3	21.9	22.0
Mar.	17.9	....	18.0	17.9	18.1	18.3	18.2	....	18.2	18.1	18.1	18.2	18.2	18.3	18.5	18.7	19.9	21.1	20.2	19.8	20.9	20.2	20.2	20.1	20.3	20.6	21.4	22.3	21.9	22.2
Apr.	18.1	....	18.1	18.1	18.3	18.5	18.4	....	18.4	18.2	18.3	18.4	18.4	18.6	18.7	18.9	20.1	21.3	20.3	20.0	21.2	20.4	20.4	20.3	20.5	20.8	21.6	22.5	22.2	22.3
May	18.3	....	18.2	18.3	18.4	18.5	18.5	....	18.5	18.3	18.4	18.6	18.6	18.8	18.9	19.0	20.2	21.5	20.5	20.2	21.4	20.6	20.6	20.6	20.7	21.0	21.7	22.7	22.4	22.5
June	18.4	....	18.4	18.4	18.6	18.7	18.7	....	18.6	18.4	18.6	18.8	18.7	18.9	19.0	19.2	20.5	21.7	20.7	20.3	21.5	20.8	20.8	20.7	20.8	21.2	21.8	22.8	22.6	22.6
July	18.5	....	18.5	18.5	18.8	18.9	18.8	....	18.7	18.6	18.7	18.9	18.8	18.9	19.1	19.3	20.7	21.9	20.9	20.4	21.5	20.9	21.0	20.8	20.9	21.3	22.0	22.9	22.8	22.8
Aug.	18.6	....	18.6	18.6	18.9	19.0	18.9	....	18.8	18.7	18.9	19.0	18.9	19.0	19.2	19.4	20.8	22.0	21.1	20.5	21.6	21.0	21.0	20.9	21.1	21.4	22.1	23.1	22.9	22.9
Sept.	18.7	....	18.8	18.8	19.0	19.1	19.0	....	18.9	18.8	19.0	19.1	19.0	19.1	19.3	19.5	20.8	22.1	21.2	20.5	21.6	21.1	21.1	20.9	21.2	21.4	22.2	23.3	23.0	23.0
Oct.	18.8	....	18.9	18.9	19.1	19.3	19.0	....	19.0	18.9	19.1	19.2	19.2	19.2	19.5	19.6	20.9	22.2	21.3	20.7	22.0	21.5	21.1	21.0	21.2	21.5	22.4	23.5	23.1	23.1
Nov.	18.8	....	19.0	19.0	19.2	19.4	19.2	....	19.1	19.0	19.2	19.3	19.3	19.4	19.7	19.7	21.0	22.3	21.5	20.9	22.0	21.5	21.3	21.3	21.4	21.6	22.4	23.5	23.2	23.2
Dec.	....	....	....	....	....	....	....	....	19.2	19.1	19.3	19.4	19.4	19.5	19.8	19.7	21.0	22.3	21.5	21.0	22.0	21.5	21.4	21.3	21.5	21.7	22.4	23.5	23.2	23.4

*Holiday.

the 18 cent level prevailing the first week of January. Thus the factories that did not purchase at the beginning of the rise in the second week of the month faced a strong, steady advance in the third week and a sudden upward swing which reached 22½ cents for spot ribs on January 25. The large companies were also out of the market the most of the month.

The heavy monthly imports are being absorbed by strong consuming interests. Their arrival did not advance the market which was moved up by speculators' activity. London stocks advanced only moderately because the heavy eastern market shipments have been landed in the United States. On January 23 spot ribs was 20¾ cents with latex at a premium of 1 cent a pound. There is plenty of roll brown for January-March position at 16 cents. On January 26 spot ribs closed at 22.2 cents.

The general aspects of the outside market considered by weekly periods were about as follows:

The market during the week ended December 29 was very inactive due to the approaching holidays and the fact that the London market was closed most of the week. Prices on all grades held almost without change and closed very steady.

Closing spot prices were: Ribs 18 cents buyers, 18⅛ cents sellers, first latex 18⅝ cents buyers, 18¾ cents sellers, B blanket crepe 17 cents buyers, 17¼ cents sellers, C blanket crepe 16¾ cents buyers, 17 cents sellers. Paras were quiet in sympathy with plantations. Upriver fine closed at 19¾ cents buyers, 20 cents sellers.

The market terminated January 5 was as quiet as that of the preceding week because the London market was not in session for much of the week. There was, therefore, but a small volume of transactions in New York on either the Exchange or outside markets.

Spot prices closed January 5 as follows: Ribs 18 cents buyers to 18⅛ cents sellers, first latex 18¾ cents buyers, 18¾ cents sellers, B blanket crepe 17 cents buyers, 17⅛ cents sellers, C blanket crepe 16¾ cents buyers, 16⅞ cents sellers. Paras quiet, Upriver closed at 20 cents both buyers and sellers.

The market of the week closed January 12 began very quiet. As the week end approached prices became gradually firmer and activity improved. While there was some factory buying the advance was so rapid that consumers as a whole held back to see if the advance would be held or a reaction develop. Factory buying therefore was temporarily suspended on the advance.

Closing spot prices for the week were: Ribs 20 cents buyers, 20¼ cents sellers, first latex 20½ cents buyers, 21⅝ cents sellers, B blanket crepe 19 cents buyers, 19¼ cents sellers, C blanket crepe 18⅞ cents buyers, 19 cents sellers.

Paras were firmer in sympathy with plantations with higher prices and fewer offers. Upriver closed at 20½ cents buyers, 22 cents sellers. Balatas were steady but dull and neglected.

The market of the week ended January 19 was quieter than that of the previous week. Prices receded from 1 cent to 1½ cents. Factories continued their waiting attitude with considerable confidence in the probable outcome of a present decline.

Spot closing prices on January 19 were: Ribs 20 cents buyers, 20¼ cents sellers, first latex 20¾ cents buyers, 20⅞ cents sellers, B blanket crepe 18¾ cents buyers, 19 cents sellers, C blanket crepe 18⅝ cents buyers, 18¾ cents sellers.

Paras advanced in sympathy with plantations but receded slightly in the absence of buying interest. Upriver closed at 22⅜ cents buyers, 22¾ cents sellers. Balatas were steady, quiet and neglected.

The market for the week ended January 26 maintained the levels reached in the advances of the previous week. In fact, on January 24 there was a pronounced forward movement and spot rose to 22.4 cents, the highest point since the beginning of the year. Consumers who were waiting for a drop were rudely disappointed by the renewed strength of the advance attributed to operations of speculators.

Singapore and the eastern markets held very firm. Friday was a holiday in Singapore. Higher New York prices are expected.

Spot closing prices on January 26 were: Ribs 21⅞ cents buyers, 22 cents sellers; first latex crepe 22¼ cents buyers, 22⅜ cents sellers; B blanket crepe 19¾ cents buyers, 20 cents sellers; C blanket crepe 19⅝ cents buyers, 19¾ cents sellers.

Paras were quiet but firm in sympathy with plantations. The holders in the primary markets are selling little and holding out for higher prices. Upriver fine closed at 23⅝ cents buyers, 23¾ cents sellers. Balatas continued quiet and neglected.

December Imports

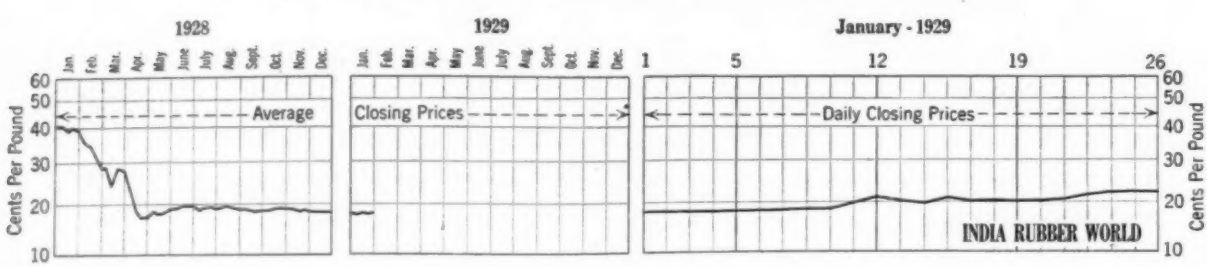
Importations of all grades in December were 46,840 tons, compared with 29,062 tons one year ago. Plantation arrivals for December were 45,486 tons, compared with 26,057 tons one year ago. Total importations of plantation rubber for twelve months ended December 31 were 429,191 tons compared with 405,543 tons for the corresponding period of 1927. Total importations of all grades of rubber for the twelve months ended December 31 were 446,421 tons compared with 432,316 tons for the corresponding period of 1927.

RUBBER AFLOAT TO THE UNITED STATES

All figures in long tons.

Week Ended	British Malaya	Ceylon	Netherland East Indies	London and Liverpool	Total
Dec. 29..	8,613	577	2,197	8	11,395
1929:					
Jan. 5..	10,035	1,479	1,608	15	13,137
Jan. 12..	9,075	1,628	1,807	299	12,809
Jan. 19..	9,469	1,231	2,152	211	13,063
Jan. 26..	7,163	1,650	2,271	47	11,131

New York Outside Market—Spot Closing Prices Ribbed Smoked Sheets



New York Outside Market—Spot Closing Rubber Prices—Cents Per Pound

Plantations	December, 1928: 24	25*	26	27	28	29	31	January, 1929: 1*	2	3	4	5	7	8	9	10	11	12	14	15	16	17	18	19
Sheet																								
Ribbed smoked	17⅞	....	17⅞	18	18⅛	18⅛	18⅛	....	18	18	18	18⅛	18⅛	18¼	18⅛	18½	19⅞	20⅛	20⅛	19¾	20¾	20⅛	20¼	20⅛
Crepe																								
First latex	18¼	....	18¾	18⅞	19	19	19	....	18½	18¼	18⅜	18⅜	18½	18½	18¾	18⅞	20¼	21	20¼	20⅜	21	20¾	20½	20¾
"B" blanket	16⅞	....	16⅞	17	17⅛	17¼	17⅛	....	17¾	17¼	17½	17⅜	17⅜	17⅜	17⅜	17⅝	18¾	19¾	18¾	18½	19½	18¾	18⅜	18½
"C" blanket	16⅝	....	16⅝	16¾	16⅞	16⅞	16⅞	....	17	17	17⅛	17⅛	17⅛	17¼	17½	17⅜	18⅜	19½	18½	18¼	19¼	18½	18⅜	18¼
"D" blanket	16⅜	....	16⅜	16⅜	16⅝	16⅝	16⅝	....	16⅝	16¾	16¾	16⅞	16⅞	16⅞	17⅛	17⅛	18⅛	19	18⅛	18	19	18⅛	18⅛	18
No. 2 brown	16⅝	....	16⅝	16¾	16⅞	17	16⅞	....	17	17	17⅛	17⅛	17¼	17¼	17½	17⅜	18⅜	19½	18½	18¼	19⅜	18½	18⅜	18¼
Rolled brown	13¼	....	13¼	13¾	13¾	13¾	13¾	....	13¼	13⅛	13	13¼	13¼	13⅛	13⅜	13⅛	14⅛	15½	15¼	15⅛	15⅜	15¼	15	15
Off latex	18½	....	18½	18⅝	18¾	18¾	18¾	....	18⅛	18	18	18⅛	18⅛	18¼	18½	18¾	19⅞	20¾	20¼	20	20¾	20⅛	20⅛	20

* Holiday.

London

The last week of December, 1928, and the first week of January, 1929, the London market was seasonally quiet on account of the holiday season. Business for that period was inactive and prices showed practically held between the 8 to 8½ pence levels with no indication of revival of market activity. London stocks increased slowly from week to week but not as much as was expected. After the holidays a better tone developed and with speculative buying the prices advanced from 8¾ pence on January 7 to 10⅜ pence on January 12. Speculation was active practically the whole of the remainder of the month and was responsible for the strength by which spot ribs stood well above the level of 10 pence.

The week ended January 19, spot ribs were virtually steady at 10⅛ pence the whole week. A sharp advance was recorded the middle of the following week when on Wednesday and Thursday speculative activity sent spot ribs to 10 7/16 and 10⅞ pence on those days, respectively.

In general there was considerable buying for home and Continental account which affected the nearby positions. Orders from America were not much in evidence. Both eastern and New York markets followed the lead in prices and activity of the London market.

The weekly record of London stocks since December 22 is as follows: December 29, 19,727 tons; January 5, 21,953 tons; January 12, 23,016 tons; January 19, 23,547 tons; January 26, 24,423 tons.

Singapore

The month's record of conditions and prices on the Singapore market reveals moderate activity and prices showing great firmness with a marked tendency to advance, which became very effective about the middle of the month when good speculative buying began and continued coincidently with the same conditions in London. On January 14 spot rib reached 10⅞ pence, its high for the month. There was some recession from this level in the next two weeks, but the price situation was strong and on the 24th spot ribs closed at 10⅞ pence.

It has been noted that rubber sells better in Singapore than in London and that American consumers seem to prefer dealing there. The Acting Registrar of Imports and Exports in his monthly rubber report shows that during the eight months ending Aug. 31, 219,717 tons of rubber were exported from British Malaya, and that of this quantity no less than 151,749 tons were consigned to the United States. Though the Singapore price may be fractionally higher, it is certain that rubber shipped direct reaches the American consumer at a lower price than if shipped to and bought through London. There can be no other explanation of the fact that while only one of the large American consumers is directly and independently represented in London they all have their own representatives in Singapore where they compete for the production from native estates and the comparatively small quantity of European plantation rubber sold in that market. There is certainly no reason why Singapore should cease to be the biggest rubber market in the world. It is possible that even larger sales would be made there if there were not still a considerable number of companies tied to London agents who get a commission on sales in the London market.

American-Dutch Union

It is reported that the Dutch banker Kloffenburg is planning to visit the United States to obtain support for the formation of an American-Dutch rubber combination, the aim of which is to make the American consumer and the Dutch producer independent of the British.

New York Quotations

Following are the New York open market rubber quotations for one year ago, one month ago and January 26, the current date

	January 26, 1928	December 26, 1928	January 26, 1929
Plantation Hevea			
Rubber latex (Hevea) gal.	$1.50 @	$1.40 @	$1.40 @
CREPE			
First latex spot	.40¼ @ .40½	.18½ @	.22½ @
January-March	.40¼ @ .40½	.18¾ @	.22½ @
April-June	.41¼ @	.18¾ @	.22¾ @
July-Sept.	@	@	.23 @
Off latex, spot	.40 @	.18¼ @	.22 @
"B" Blanket, spot	.37¼ @ .38	.17 @	.20½ @
January-March	.37¾ @	.17 @	.20½ @
April-June	.38¼ @	.17¼ @	.21 @
July-Sept	@	@	.21½ @
"C" Blanket, spot	.37½ @ .37½	.16¾ @	.20⅜ @
Brown No. 1	.37¼ @	.16¾ @ .17	.20¼ @
Brown No. 2	.37 @	.16½ @ .16¾	.20 @
Brown, roll	.33¼ @ .33½	.13¼ @ .13⅜	.16½ @
Sheet			
Ribbed, smoked spot	.40 @ .40¼	.17⅞ @ .18	.22 @
January-March	.40⅜ @	.18 @ .18¼	.22¼ @
April-June	.41⅛ @ .41¼	.18⅜ @ .18½	.23 @
July-Sept.	@	@	.23¼ @
East Indian			
PONTIANAK			
Banjermasin	.09 @ .10	.11 @	.10 @ .12
Pressed block	.15 @	.20 @ .21	.18 @ .19
Sarawak	.10 @	†.10 @	@
South American			
PARAS			
Upriver, fine	.30¼ @	.20 @	.23½ @
Upriver, fine	*.47¼ @	*.25¼ @	*.29 @
Upriver, coarse	.26 @	.14¼ @	.15 @
Upriver, coarse	*.37¼ @	*.19½ @	*.22 @
Islands, fine	.29 @	@	@
Islands, fine	*.40 @	*.25¼ @	*.28½ @
Acre, Bolivian, fine	.31½ @	.20¾ @	.24½ @
Acre, Bolivian, fine	@	*.26½ @	*.30 @
Beni, Bolivian	.32¼ @	.21 @	.25 @
Madeira, fine	.31 @	.20 @	.23½ @

	January 26, 1928	December 26, 1928	January 26, 1929
South American			
PARAS—*Continued*			
Peruvian, fine	$0.30½ @	$0.19 @	$0.22½ @
Tanajos, fine	.29¾ @	.19¼ @	.22½ @
CAUCHO			
Upper caucho ball	.26½ @	.13 @	.15 @
Upper caucho ball	*.38 @	*.19½ @	*.22 @
Lower caucho ball	.24¾ @	.12¼ @	.14 @
Maniçobas			
Ceará negro heads	.25 @	†.17 @	†.18 @
Ceará scrap	.16 @	†.09 @	†.10 @
Maniçoba, 30% guaranteed	.30 @	†.19 @	†.20 @
Mangabiera, thin sheet	.32 @	†.19 @	†.20 @
Centrals			
Central scrap	.25 @	.11½ @ .12	.13½ @ .15
Central wet sheet	.20 @	.08 @ .10	@
Corinto scrap	.25 @	.11½ @ .12	@
Esmeralda sausage	.25 @	†.11½ @	.13½ @ .15
Guayule			
Duro, washed and dried	.32 @	.17½ @	.17½ @
Ampar	@	.18½ @	.18½ @
Gutta Percha			
Gutta Siak	.22 @	.23½ @	.20 @ .22
Gutta Soh	.38 @	†.35 @	.30 @ .32
Red Macassar	2.80 @ 3.00	2.95 @	2.90 @
Balata			
Block, Ciudad Bolivar	.43½ @	.49 @ .51	.50 @ .51
Colombia	.43 @ .44	.48 @	.46 @ .47
Manaos block	.46 @	.55 @ .57	.55 @ .56
Panama	.42 @	.48 @	.46 @ .47
Surinam sheet	.56 @ .57	.49 @ .50	.49 @ .50
Amber	.60 @ .61	.53 @ .55	.53 @ .54
Chicle			
Honduras	‡.65 @	‡.68 @	‡.68 @
Yutacan, fine	‡.65 @	‡.68 @	‡.68 @

*Washed and dried crepe. Shipment from Brazil.
†Nominal. ‡Duty paid.

New York Outside Market—Spot Closing Rubber Prices—Cents Per Pound

PLANTATIONS	January, 1929 21	22	23	24	25	26
Sheet						
Ribbed smoked	20¼	20½	21¼	22⅜	21⅞	22
Crepe						
First latex	20½	20¾	21⅝	22⅝	22¼	22⅜
"B" blanket	18⅝	18⅝	19⅜	20½	20¾	20⅜
"C" blanket	18⅛	18⅜	19¼	20½	20⅛	20⅛
"D" blanket	18⅛	18	19⅛	20	19¾	19⅝
No. 2 brown	18⅜	18⅜	19⅜	20⅛	20⅛	20⅛
Rolled brown	14⅞	15	16	16⅝	15⅞	16⅛
Off latex	20¼	20⅜	21¼	22¼	22	22⅛

Low and High New York Spot Prices

PLANTATIONS	1929*	January 1928	1927
First latex crepe	$0.18⅝ @ $0.22¾	$0.38⅞ @ $0.41¼	$0.38 @ $0.41½
Smoked sheet, ribbed	.18 @ .22¾	.38⅝ @ .41¼	.37¾ @ .41½
PARAS			
Upriver, fine	.19¾ @ .24	.29¼ @ .33½	.29 @ .34¼
Upriver, coarse	.14 @ .16¾	.24 @ .26¼	.22 @ .25
Islands, fine	.18¾ @ .22	... @ ...	.26 @ .31

*Figured to January 26, 1929.

Reclaimed Rubber

PRODUCTION and demand for reclaim are both maintained at the high levels prevailing for the past several months. Total consumption for 1928 amounted to 173,434 tons according to corrected official figures as compared to 180,000 tons which was the consumption estimated by reclaimers early in the year. The current outlook indicates that consumption of reclaim in 1929 will substantially exceed 175,000 tons.

The advance in compounding practice is certain to broaden the field for the use of reclaim with regard to improvement of stocks against flexing failure and tension cracking by the use of appropriate fatigue inhibitors. The remarkable constancy of standard reclaim grades in gravity, volume cost and specified physical properties renders them as dependable within their range of technical value as crude rubber or any compounding ingredient. This ensures them an assured place in all lines of rubber goods manufacture quite independent of crude rubber all grades of which at current levels are much above reclaim in volume cost.

The standard grades of reclaim quoted below remain unchanged in price from the prices recorded last month.

New York Quotations

January 26, 1929

High Tensile	Spec. Grav.	Price Per Pound
Super-reclaim, black	1.20	$0.12 @$0.12½
red	1.20	.12½ @ .13
Auto Tire		
Black	1.21	$0.07½ @$0.07¾
Black selected tires	1.18	.08 @ .08¼
Dark gray	1.35	.09½ @ .09¾
Light gray	1.38	.12 @ .12½
White	1.40	.13 @ .13½
Shoe		
Unwashed	1.60	.07¼ @ .07½
Washed	1.50	.10 @ .10¼
Tube		
No. 1	1.00	.13½ @ .14
No. 2	1.10	.10½ @ .11
Miscellaneous		
Red	1.35	.12 @ .13
Truck tire, heavy gravity	1.55	.07 @ .07¼
Truck tire, light gravity	1.40	.07½ @ .07¾
Mechanical blends	1.60	.06¾ @ .07½

Rubber Scrap

THE consumption of rubber scrap for 1928 was higher than in any previous year, corresponding roughly to double the tonnage of reclaim produced. Collections of tire and other scrap are being maintained at the usual winter average which is naturally not equal to the rate of collection in less inclement seasons.

Prices of all tire stocks are sustained at the levels of last month with a slight advance in that for peelings.

Boots and shoes continue firm and are passing steadily into reclaim for insulation, auto topping, proofing and footwear lines.

All grades of inner tubes have increased in demand. Prices for No. 2 quality and red have advanced very slightly.

Export demand from Europe is steady and applies to all grades. The cheaper ones, however, are favored.

In view of the firmness of the 20 cent level for crude rubber the outlook for the mutually dependent lines of reclaim and rubber scrap for 1929 business is regarded as very favorable.

CONSUMERS' BUYING PRICES

Carload Lots

East of Pittsburgh, Pa.

January 26, 1929

		Prices
Boots and Shoes		
Boots and shoes, black	lb.	$0.01⅜ @$0.01⅝
Untrimmed artics	lb.	.00¾ @ .00⅞
Tennis shoes and soles	lb.	.00¾ @ .01
Hard Rubber		
No. 1 hard rubber	lb.	.08 @ .08½
Mechanicals		
Mixed black scrap	lb.	$0.00½ @$0.00¾
Hose, air brake	ton	32.50 @35.00
Regular soft	lb.	17.50 @20.00
No. 1 red	lb.	.02 @ .02¼
No. 2 red	lb.	.01 @ .01½
White druggists' sundries	lb.	.02 @ .02½
Mechanical	lb.	.01½ @ .01¾
Tires		
Pneumatic Standard—		
Mixed auto tires with beads	ton	23.50 @24.50
Beadless	ton	32.00 @34.00
White auto tires with beads	ton	40.00 @42.00
Beadless	ton	50.00 @57.50
Mixed auto peeling	ton	35.50 @38.00
Solid—		
Mixed motor truck, clean	ton	20.00 @21.00
Inner Tubes		
No. 1, floating	lb.	.06½ @ .06¾
No. 2, compounded	lb.	.04½ @ .04¾
Red	lb.	.05¾ @ .05½
Mixed tubes	lb.	.04¼ @ .04⅜

Stabilizing Chlorinated Rubber[1]

A new process is said to overcome one of the drawbacks to the use of chlorinated rubber, especially its use as an electrical insulating material. Such rubber is made by causing chlorine to react by various methods with rubber, especially raw or crude, whereby products are obtained containing from 40 to 67 per cent or more of combined chlorine. They are hard, rather tough solids, superior to most resins in many applications, and readily soluble in benzol or its homologues, toluol and xylol, solvent naphtha, the chlorbenzols, carbon bisulphide or tetrachloride, trichlorethylene, or other solvents. A fault of such otherwise useful material, especially of the more highly chlorinated varieties, and particularly with rapidly-rising temperature, is a tendency to decompose, hydrochloric acid being liberated and corrosion being induced in metals coated with such treated rubber, or to cause deterioration in paper or fabrics impregnated with such solutions.

To stabilize chlorinated rubber and to offset deleterious action, antacid substances soluble in the same solvents as the rubber are incorporated with it, their general action being to unite with the nascent hydrochloric acid and to form neutral compounds. Among such antacids are mentioned aniline, toluidine, xylidine, and the like, all said to be effective stabilizers; and diphenylamine, phenylene diamine, urea, etc., which keep solutions non-acid, remaining as solids after solvent evaporation, and which also stabilize the chlorinated rubber. Where complete homogeneity is not essential the use of antacids insoluble in solvents for chlorinated rubber is not precluded. Such materials include zinc oxide, barium oxide, magnesia, etc. It is said that such stabilizing treatment may also be applied to any halogenated crude or artificial rubber, gutta percha, or balata.

[1] U. S. Patent 1,695,641, Dec. 18, 1928. Carleton Ellis, Montclair, N. J., assignor to Chadeloid Chemical Co., New York, N. Y.

Underwriters' Laboratories Rubber Research

In the annual review of work at the Underwriters' Laboratories, Chicago, Ill., for 1928 the following reference is made to that of the Rubber Division:

The usual very large volume of physical and chemical test work upon rubber-covered electric wire of many varieties, rubber-lined fire hose, chemical engine hose, and miscellaneous rubber devices has been done with increasing efficiency. Upwards of 5,000 separate samples of rubber have been tested. The product of an additional manufacture of cotton rubber-lined fire hose has been investigated and listed under the laboratories' standard. All of those municipalities which in the past few years have abandoned their practice of purchasing fire department hose under their own standard specifications in favor of Underwriters' Laboratories' labeled hose have continued to purchase labeled hose in increased quantity during 1928.

Cooperating with twelve other rubber laboratories, a rather extensive investigation of the aging of vulcanized rubber is being carried on. This includes actual aging of rubber under various conditions and also accelerated aging tests, all the laboratories involved using samples from the same lots of rubber compound. The work is being done under the auspices of the American Society for Testing Materials.

Compounding Ingredients

THE enlarged schedules set for the production of automobiles this year have exerted immediate effect on tire and tube manufacture. The output of tire plants did not decrease in January and is now steadily increasing to meet the enlarged demand in sight. In other divisions of the industry, rubber goods production is seasonably normal with a good future prospect.

ACCELERATORS. A new liquid accelerator now under rubber manufacturing and service test is destined shortly to be announced.

ANTIOXIDANTS. The list of well known antioxidants has been increased by the addition of a new candidate for favor known as Albasan.

BENZOL. About the first of the year production decreased owing to seasonal conditions. Prices are firm and unchanged.

CARBON BLACK. There was an advance of ½ cent a pound early in January and demand has since continued active by rubber makers.

CLAY. The consumption of reinforcing clays continues very active at increased tonnages.

DEGRAS. Prices hold steady with better inquiry and good future business indicated.

LITHARGE. In the latter part of January more interest in litharge became evident on the part of consumers. Demand is still moderate and prices are firm.

MINERAL RUBBER. Production is active at capacity to meet full and active demand. Prices are firm.

SOLVENT NAPHTHA. Stocks around the opening of the year were sold ahead. Active consuming demand continues.

V. M. P. NAPHTHA. Market was firm and trade routine the first of January. Prices hold firm and trade is improving.

STEARIC ACID. Spot supplies a month ago were reported small and the market strong. These conditions continue.

ZINC OXIDE. Production was well booked ahead January 1, although rubber makers' demand slackened then it is now strong and steady.

New York Quotations

January 26, 1929

Accelerators, Inorganic

Lead, carbonate	lb.	$0.08½	@
Lead, red	lb.	.10	@
sublimed white	lb.	.08	@
sublimed blue	lb.	.08	@
super-sublimed white lead	lb.	.08¼	@
Lime, R. M. hydrated	ton	25.00	@
Litharge	lb.	.09	@
Magnesia, calcined heavy	ton	90.00	@
Magnesia carbonate	lb.	.06	@ .08
Orange mineral A.A.A	lb	.12	@

Accelerators, Organic

A-7	lb.	.55	@ .65
A-11	lb.	.62	@ .75
A-16	lb.	.57	@ .65
A-19	lb.	.58	@ .75
A-20	lb.	.64	@ .80
A-32	lb.	.78	@ .95
Aero X	lb.		@
Aldehyde ammonia	lb.	.65	@ .70
B. B.	lb.		@
Captax	lb.		@
Crylene, hard form	lb.		@
Paste	lb.		@
Di-ortho-tolylguanidine	lb.	.42	@ .52
D. P. G.	lb.	.30	@ .36
Ethylidine aniline	lb.	.45	@ .47½
Formaldehyde aniline	lb.	.34	@ .44
Grasselerator 102	lb.	.62½	@ .63½
552	lb.	4.45	@
808	lb.	.80	@ .85
833	lb.	1.17	@ 1.35
Heptene	lb.		@
Hexamethylene tetramine	lb.	.56	@ .62½
Lead oleate, No. 999	lb.	.15½	@
Witco	lb.	.18	@
Methylene dianiline	lb.	.35	@ .45
Monex	lb.		@
Piperidine pentamethylene dithio carbamate	lb.	4.45	@ 4.60
Plastone	lb.		@
R-2	lb.	2.00	@ 2.50
R. & H. 40	lb.	.40	@ .42½
50	lb.	.40	@ .42½
Safex	lb.		@
Super-sulphur, No. 1	lb.		@
No. 2	lb.		@
Tensilac No. 39	lb.	.50	@ .52½
No. 41	lb.	.50	@ .52½
Thermle F	lb.	.50	@ .55
Thiocarbanilid	lb.	.25½	@ .26½
Trimene	lb.		@
base	lb.		@
Tuads	lb.		@
ZBX	lb.		@
Z-88	lb.	.50	@ .60
Zimate	lb.		@

Acids

Acetic 28% (bbls.)	100 lbs.	3.88	@ 4.13
glacial (carboys)	100 lbs.	14.18	@ 14.43
Sulphuric, 66°	160 lbs.	1.60	@

Alkalies

Caustic soda, 76% solid	100 lbs.	2.90	@

Anti-Oxidants

Age-Rite, powder	lb.		@
resin	lb.		@
white	lb.		@

Anti-Oxidants—*(Continued)*

Antox	lb.		@
Grasselerager A	lb.	$0.55	@
Oxynone	lb.	.68	@ .90
Resistox	lb.	.54	@ .65
Stabilite	lb.	.64	@
V. G. B.	lb.		@

Colors

BLACK

Bone	lb.	.08	@
Carbon (see compounding ingredients)			
Drop	lb.	.05½	@ .15
Gastex	lb.	.05½	@ .07
Lampblack (commercial)	lb.	.09	@

BLUE

Akco blue	lb.	1.80	@
Huber Brilliant	lb.	4.20	@ 4.70
Prussian	lb.	.35	@
Ultramarine	lb.	.09	@ .25

BROWN

Huber Mocha	lb.	1.60	@ 2.10
Sienna, Italian, raw	lb.	.05½	@ .12½

GREEN

Akco green	lb.	2.60	@
Chrome, light	lb.	.27	@ .31
medium	lb.	.28	@ .31
Huber Brilliant	lb.	4.35	@
Oxide of chromium	lb.	.34	@ .38

ORANGE

Huber Persian	lb.	.50	@ 1.00

RED

Akco red	lb.	2.75	@
Antimony, golden, No. 40	lb.		@
No. 60	lb.	.16	@ .20
golden 15/17%	lb.	.20	@ .25
Aristi	lb.	2.75	@
Huber Brilliant	lb.	1.35	@ 1.85
Antimony			
Crimson, R.M.P. No. 3	lb.	.48	@
Sulphur free	lb.	.52	@
7-A.	lb.	.35	@
Z-2	lb.	.22	@
Vermilion, No. 5	lb.		@
No. 15	lb.		@
Iron Oxides			
bright pure domestic	lb.	.12	@
bright pure English	lb.	.14	@
bright reduced English	lb.	.12	@
bright reduced domestic	lb.	.10	@
Indian (maroon), pure domestic	lb.	.11	@
Indian (maroon), pure English	lb.	.11	@
Indian (maroon), reduced English	lb.	.09	@
Indian (maroon), reduced domestic	lb.	.08	@
Oximony	lb.	.13¼	@
Spanish red oxide	lb.	.03	@ .04¼
Sunburnt red	lb.	.14½	@
Venetian reds	lb.	.02	@ .05
Vermilion, Eng. quicksilver	lb.	2.05	@

Colors—*(Continued)*

WHITE

Lithopone	lb.	$0.05½	@
Albalith	lb.		@
Azolith	lb.	.05¼	@ .05¾
Grasselli	lb.	.05¼	@ .05¾
Sterling	lb.		@
Vanolith	lb.	.05¾	@
Titanox	lb.	.09½	@ .10
Zinc Oxide			
AAA (lead free)	lb.	.07	@
Azo (factory):			
ZZZ (lead free)	lb	.06½	@ .07
ZZ (leaded)	lb.	.06¾	@ .06⅞
Z (8% leaded)	lb.	.06¾	@ .06⅞
French Process			
Green seal	lb.	.10⅞	@
Red seal	lb.	.09⅞	@
White seal	lb.	.11⅞	@
Kadox	lb.		@
XX	lb.		@

YELLOW

Akco yellow	lb.	1.45	@
Cadmium sulphide	lb.	.75	@ 1.00
Chrome	lb.	.16	@ .16¼
Grasselli cadmium	lb.		@
Huber canary	lb.	3.30	@ 3.80
Ochre, domestic	lb.	.01½	@ .02¾
Oxide, pure	lb.	.08½	@
Zinc, C. P., imported	lb.	.23	@

Compounding Ingredients

Aluminum flake (sacks, c.l.)	ton	21.85	@
(sacks l.c.l.)	ton	24.50	@
Ammonium carb. pwd.	lb.	.12	@ .13
lump	lb.	.12	@ .16
Asbestine	ton	25.00	@
Barium, carbonate	ton	57.50	@ 60.00
Baryta white (f.o.b. St. Louis, bbls.)	ton	23.00	@
Baryta white (f. o. b. St. Louis, bags)	ton	22.20	@
Barytes, imported	ton	27.00	@ 34.00
pure white	ton	35.00	@
off color	ton	27.50	@
medium	ton	30.00	@
Foam "A" (f. o. b. St. Louis, bbls.)	ton	23.00	@
Foam "A" (f. o. b. St. Louis, bags)	ton	23.00	@
Basofor	lb.	.04½	@
Blanc fixe, dry	lb.	.04½	@
pulp	ton	42.50	@ 45.00
Carbon Black			
Aerfloted arrow	lb.	.08½	@ .12
Compressed	lb.	.08½	@ .12½
Uncompressed	lb.	.08	@ .12
Fumonex	lb.	.06	@ .09
Micronex	lb.	.09	@ .13
Carrara filler	ton	20.00	@
Chalk	ton	12.00	@
Clay, Blue Ridge, dark	ton		@
Blue Ridge, light	ton		@
China	lb.	.03	@ .03½
Dixie	ton		@
Langford	ton		@
Mineral flour (Florida)	ton		@
Perfection	ton	35.00	@
Suprex	ton	10.00	@ 22.00
Tensulite	ton	25.00	@

Compounding Ingredients *(Continued)*

Cotton flock, black	lb.	$0.13	@	
light-colored	lb.	.09½	@	.11
white	lb.	.12	@	.30
Glue, high grade	lb.	.25	@	.30
low grade	lb.	.22	@	.26
Infusorial earth	ton	25.00	@	
Mica, amber (fact'y)	ton	90.00	@	
Neomerpin, S. A. conc.	lb.	.60	@	
Pumice stone, powd.	lb.	.02½	@	.04
Rotten stone (bbls.)	lb.	.02½	@	.04½
Soap bark	lb.	.14½	@	.15
Soapstone	ton		@	22.00
Talc, domestic	ton	25.00	@	
French	ton	18.00	@	22.00
Pyrax A	ton		@	
B	ton		@	
Thermatomic carbon	lb.		@	
Velvetex	lb.	.04½	@	.06
Whiting				
Domestic	100 lbs.	1.00	@	
English, cliffstone	100 lbs.	1.50	@	
Quaker	ton		@	
Slate flour, gray (fact'y)	ton	7.00	@	
Snow white	ton		@	
Sussex	ton		@	
Vancolloid	ton	27.00	@	
Vansulite	ton	26.00	@	
Westminster Brand	100 lbs.		@	
Witco (L. c. l.) (f. o. b. [illegible]				
New York	ton	15.00	@	
Whiting, imp. chalk	100 lbs.	.90	@	1.00
Paris White, Eng. Cliff.	100 lbs.	1.50	@	3.00

Factice—See Rubber Substitutes

Mineral Rubber

Fluxrite (solid)	lb.	.05½	@	.06
Genasco (fact'y)	ton	50.00	@	52.00
Gilsonite (fact'y)	ton	37.14	@	39.65
Granulated M. R.	ton		@	
Hydrocarbon, hard	ton		@	
Hydrocarbon, soft	ton		@	
Ohmlac Kapak, M. R.	ton	40.00	@	90.00
M-4	ton	175.00	@	
Paradura (fact'y)	ton	62.50	@	65.00
Pioneer, M. R., solid (fac.)	ton	40.00	@	42.00
M. R. granulated	ton	50.00	@	52.00
Robertson, M. R., solid (fact'y)	ton	34.00	@	80.00
M. R. gran. (fact'y)	ton	38.00	@	80.00
Vansul Puro	ton	27.00	@	

New York Quotations

January 26, 1929

Oils

Mineral	gal.	$0.20	@	
Kerosene	gal.	.15	@	
Rapeseed	gal.	.86	@	
Red oil, distilled	lb.	.09⅞	@	.10⅜
Rubber process	gal.	.25	@	
Spindle	gal.	.30	@	

Rubber Substitutes or Factice

Black	lb.	.08	@	.14
Brown	lb.	.08	@	.15
White	lb.	.09	@	.16

Softeners

Burgundy pitch	100 lbs.	5.00	@	6.00
Atlas	100 lbs.	6.50	@	
Corn oil	lb.	.10½	@	
Cottonseed oil	lb.	.11	@	
Cycline oil	gal.	.28	@	.35
Degras	lb.	.03½	@	.04½
Fluxrite (fluid)	lb.	.05¼	@	.06
Moldrite	lb.	.07	@	.07½
Palm oil (Lagos)	lb.	.10	@	
Palm oil (Niger)	lb.	.09	@	
Palm oil (Witco)	lb.	.11	@	
Para-flux	gal.	.17	@	
Petrolatum, snow white	lb.	.08½	@	.08¾
Pigmentar	lb.	.038	@	.0446
Pine oil, steam distilled	gal.	.62	@	.63
Rosin K	bbl.	9.90	@	
Rosin oil, compounded	gal.	.36	@	
No. 3	gal.	.60	@	
No. 556	gal.	.51	@	
Rubite	lb.	.10½	@	
Rubtack	lb.	.11	@	
Stearex	lb.	.16	@	.20
Stearic acid, double pressed	lb.	.18	@	.18½
Tackol	lb.	.09	@	.15
Tar (retort)	bbl.	12.50	@	13.00
Tasco W-S No. 1	lb.	.06	@	
A	lb.	.05	@	
Vansulol	lb.	.12½	@	
Vantar (Pine Tar)	gal.	.36	@	
Waxene	lb.	.30	@	.40
Woburn oil	lb.	.05½	@	.06

Solvents

Benzol (90%, 7.21 lbs. gal.)	gal.	$0.28	@	
Carbon bisulphide (99.9%, 10.81 lbs. gal.) (drums)	lb.	.05½	@	.08
tetrachloride (99.7%, 13.28 lbs. (gal.) (drums)	lb.	.06¼	@	.10
Cyclohexanone	lb.	.65	@	
Dip-Sol	gal.	.13	@	
Dryolene	gal.	.11	@	
Gasoline				
No. 303				
Tankcars	gal.	.15	@	
Drums, c. l.	gal.	.31	@	
Drums, l. c. l.	gal.	.36	@	
Hexalin	lb.	.60	@	
acetate	lb.	.65	@	
Rubberlene	gal.	.11½	@	
Rub-Sol	gal.	.10½	@	
Solvent naphtha	gal.	.35	@	
Stod-Sol	gal.	.10	@	
Sweet rubber cement naphtha	gal.	.16½	@	
Turpentine, Venice	lb.	.20	@	
steam distilled	gal	.59	@	.60

Vulcanizing Ingredients

Sulphur				
Velvet flour (240 lb. bbls.)	100 lbs.	2.95	@	3.50
(150 lb. bags)	100 lbs	2.60	@	3.15
Soft rubber (c.l.)	100 lbs.	2.40	@	2.75
(l.c.l.)	100 lbs.		@	
Superfine commercial flour (210 lb. bbls.)	100 lbs.	2.55	@	3.10
(100 lb. bags)	100 lbs.	2.40	@	2.80
Tire brand, superfine	100 lbs.	1.90	@	2.25
Tube brand, velvet	100 lbs.	2.40	@	2.75
Sulphur chloride	lb.	.05	@	.07
Vandex (selenium)	lb.		@	
(See also Colors—Antimony)				

Waxes

Beeswax, white, com	lb.	.50	@	.55
carnauba	lb.	.42	@	
ceresine, white	lb.	.10	@	.11
montan	lb.	.07	@	.07½
ozokerite, black	lb.	.24	@	.25
green	lb.	.26	@	.30
Paraffin				
122/124 white crude scale	lb.	.06	@	
124/126 white crude scale	lb.	.06	@	
120/122 fully refined	lb.	.07½	@	
125/127 fully refined	lb.	.07½	@	

Slow-Motion Vulcanization

In these days when with ultra-accelerators fully-vulcanized rubber products can be supplied in a few minutes if desired, it is curious to turn back to a time when six months were spent in trying to vulcanize a sample of pure Pará rubber. In February, 1912, the rubber was put in a jar with flour of sulphur, the jar tightly sealed, and the sample, kept meanwhile in a mill compartment at a temperature of 115° F., was not inspected until August. A 16-hour acetone extraction then showed the rubber to have a combined sulphur content of over 0.49. It was estimated that in another month the percentage would have been over 0.57, and that within eight years the rubber would have been perfectly vulcanized if kept under the same conditions. The experiment was regarded as indicating that even at 115° F. there is sufficient dissociation of sulphur to initiate vulcanization in sulphur-free virgin rubber; and a conclusion was also drawn that vulcanization actually begins, though in a minute degree, from the moment of compounding.

Why Cemented Joints Fail

Some of the reasons why joints in rubber products united with vulcanizing cement fail to show proper strength and curing properties, the *India Rubber Journal* points out, are: The use of low-grade solvent, insufficient drying time, moist air in the workroom, surface of materials too heavily floured or air or sun-cured, scorching, or settling of heavy compounding ingredients in the paste so as to cause uneven adhesion, a trouble often traced to churning too much paste at a time.

While for the best grades of materials a thin solution will give the utmost adhesion, low-quality materials require a heavy coat of paste as they absorb much of the fluid. In footwear making, the bare fabrics must be given a stiff coating, and for such use a heavy paste made with 35 gallons of high grade naphtha (or equivalent) and 100 lbs. of rubber stock is recommended. If the nature of the work permits the use of slow-drying solvents, much economy can be effected. Cements for shoes and clothing and other dry-heat products are ordinarily compounded with ½ lb. litharge and ½ oz. sulphur to each pound of fine Pará, and 4 to 12 oz. of whiting. Powdered rosin or shellac is seldom used unless for low-cure articles or to replace rubber when the latter is dear. Organic accelerators now efficiently replace lithage, especially for light-colored materials. Where black pastes are needed, carbon black and mineral rubber make a smooth-working cement and are non-settling.

Pure solutions (9 or 10 oz. of rubber to a gallon of naphtha) are usually made without breaking down the rubber. A much stronger and more uniform working paste is obtained without milling.

Bus Transportation

The average life of sixty-six representative bus lines, according to *Automobile Topics*, was but four years. However, their aggregate mileage was five per cent greater than that of railroads and 463 per cent greater than that of street railroads now in operation. Proof of the wonderful growth of this business is shown in the total of 86,000 buses registered which compares favorably with the total of 100,000 units in operation at the zenith of the street railroad business.

Rubbers Prevent Flu

Wet feet are the cause of many cases of flu and might so easily be avoided if everyone would be sure to wear rubbers. The principal offenders against this edict are the men, as the present-day fashions for women make galoshes an important part of the wardrobe.

Tire Output for 1929

Manufacturers are all agreed that 1929 shows splendid prospects of being a banner year for the tire industry, which enters the new year on the soundest economic basis it has enjoyed in a decade. It has been estimated that more than 75,000,000 pneumatic tire casings will be made during the year.

Cotton and Fabrics

AMERICAN COTTON. The price of spot middling cotton on January 2 was 20.10 cents compared with 20.60 cents on December 1, 1928. Up to January 26 spot middling cotton remained above 20 cents with the exception of the seventh of the month when it fell to 19.95 cents. Otherwise the tendency was upward and on January 26 spot was 20.10 cents.

The tentative dates on which the cotton crop reports will be issued during 1929, are as follows: May 17, revision of acreage and yield of cotton in 1928. July 8, acreage of cotton in cultivation July 1, 1929. August 8, as of August 1 condition and probable total ginnings of cotton. September 9, as of September 1 condition and probable total ginnings of cotton and estimate of the acreage of cotton abandoned since July 1. October 8 as of November 1 on probable total ginnings. December 9, as of December 1 on preliminary estimate of probable total ginnings of cotton and estimate of acreage of cotton abandoned since July 1 and acreage harvested.

AMERICAN STAPLES. The past month has marked the turning point in the staple basis, which during the late fall had reached the lowest point in many years. All indications now point to a return to normal, as the very cheap basis resulted not only in heavy sales of staples, but also allowed shippers to ship full on all contracts, thereby reducing stocks considerably. Delta cottons grading middling and higher have advanced in basis from one to three hundred points in the last fortnight and any heavy buying movement would undoubtedly cause an even more rapid rise. The basis on American staples is somewhat firmer.

ARIZONA PIMAS. The crop has been largely sold and very little of the better qualities is offered.

SUDAN SAKEL. Reports indicate a satisfactory crop, though somewhat smaller than anticipated.

Cotton Fabrics

DUCKS, DRILLS AND OSNABURGS. The market conditions on these fabrics both as to demand and prices are essentially unchanged from those of one month ago. That is to say business in general is active at unchanged prices and the outlook is satisfactory.

RAINCOAT FABRICS. The raincoat business is very quiet as the present is the dull season. Manufacturers are making up their new lines and expect spring business to start much earlier this year than usual owing to the fall demand being cut short. Apparently there will be no outstanding vogue this year but tweeds, leatherette and twills will sell in about equal numbers.

SHEETINGS. The activity in the grey goods market after the turn of the year was rather disappointing. During the past week inquiry has increased and production has easily been absorbed in sales. Sheeting has been lagging behind but business has been done on print cloth numbers. The trade confidently expects inquiry to broaden. A very satisfactory first quarter is therefore anticipated.

TIRE FABRICS. Conditions in the tire market are considered fairly healthy. All the mills are favored with a reasonable volume of business ahead. Tire manufacturers report that they are going to have good business the present year. The fabric trade is consequently correspondingly hopeful. Tire fabric producing capacity, however, is large and the mills will not experience any special difficulty in supplying the enlarged demand.

New York Quotations

January 26, 1929

Drills

38-inch	2.00-yard.....*yard*	$0.17½ @
40-inch	3.47-yard.....	.10¾ @
50-inch	1.52-yard.....	.24½ @
52-inch	1.90-yard.....	.19¾ @
52-inch	2.20-yard.....	.17¼ @
59-inch	1.85-yard.....	.20 @

Ducks

38-inch	2.00-yard S. F..*yard*	.17¼ @
40-inch	1.45-yard S. F.....	.22¾ @
72-inch	1.05-yard D. F.....	.38 @
72-inch	16.66-ounce.....	@
72-inch	17.21-ounce.....	@

MECHANICAL

Hose and belting....*pound*		.37½ @
Specials		.40½ @

TENNIS

52-inch	1.35-yard .....*yard*	.27½ @

Hollands

R.T.5—30-inch	.....*yard*	.16 @
R.T.7—36 inch	.....	.18 @
R.T.8—40-inch	.....	.20 @

RED SEAL

36-inch	.....	.15½ @
40-inch	.....	.16½ @
50-inch	.....	.25 @

GOLD SEAL

40-inch, No. 72	.....	.20¼ @
40-inch, No. 80	.....	.22 @

Osnaburgs

40-inch	2.35-yard .....*yard*	$0.15¼ @
40-inch	2.48-yard	.14½ @
40-inch	3.00-yard	.12 @
40-inch	10-oz. part waste..*lb.*	.19½ @
37-inch	2.42-yard	.14¾ @

Raincoat Fabrics

COTTON

Bombazine 64 x 60....*yard*		.11 @
Bombazine 60 x 48.....		.10 @
Plaids 60 x 48.....		.12½ @
Plaids 48 x 48.....		.11½ @
Surface prints 64 x 60.....		.13½ @
Surface prints 60 x 48.....		.12¾ @
Print cloth 38½-in.. 60 x 48.		.06¾ @
Print cloth, 38½, 64x60....		.07¾ @

Sheetings, 40-inch

48 x 48, 2.50-yard.....*yard*	.12¾ @	.13
48 x 48, 2.85-yard.....	.11¼ @	
64 x 68, 3.15-yard.....	.12 @	
56 x 60, 3.60-yard.....	.09¾ @	.09⅞
44 x 48, 3.75-yard.....	.08⅝ @	.08½

Sheetings, 36-inch

48 x 48, 5.00 yard.....*yard*	.06⅞ @	.07
40 x 44, 6.15-yard.....	.05¾ @	

Tire Fabrics

SQUARE WOVEN 17¼-ounce

Peeler, karded.....*pound*	$0.48 @	

BUILDER 28/11

Peeler, karded.....*pound*	.48 @	

BUILDER 10/5

Peeler, karded.....*pound*	.45 @	

CORD 23/5/3

Peeler, karded, 1 1/32-in..*pound*	.48 @	

CORD 23/4/3

Peeler, karded.....*pound*	.49 @	

CORD 23/3/3

Peeler, karded.....*pound*	.48½ @	

CORD 15/3/3

Peeler, karded.....*pound*	.46 @	

CORD 13/3/3

Peeler, karded.....*pound*	.45 @	

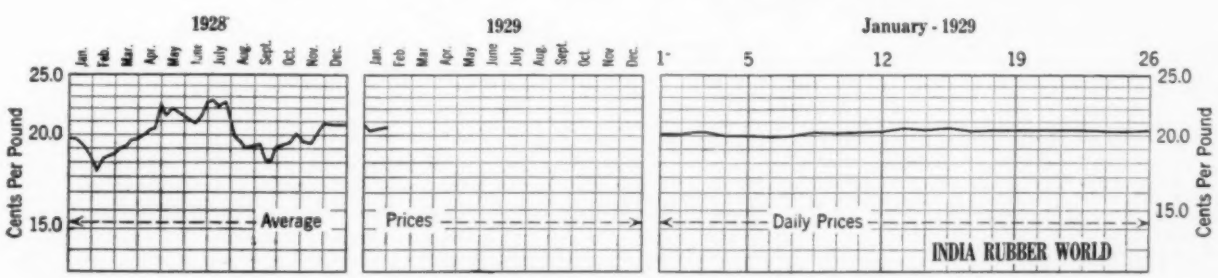
LENO BREAKER

8-oz. Peeler, karded..*pound*	.48 @	
10-oz. Peeler, karded.....	.48 @	

CHAFER

9.5-oz. Peeler, karded.*pound*	.49 @	
12-oz. Peeler, karded.....	.48 @	
14-oz. Peeler, karded.....	.48 @	

Ratio Graph of New York Daily Prices of Spot Middling Upland Cotton



Crude Rubber Arrivals at New York as Reported by Importers

Plantations

CASES

DEC. 16. By "Pres. Jefferson," Far East.

H. A. Astlett & Co.	†392
Littlejohn & Co., Inc.	†5,478

DEC. 17. By "Minnekahda," Europe.

General Rubber Co.	30
Littlejohn & Co., Inc.	220

DEC. 19. By "City of Manila," Far East.

H. A. Astlett & Co.	119
Bierrie & Co., Inc.	42
General Rubber Co.	460
Haldane & Co., Inc.	320
Lavino American & Asiatic Co.	86
Littlejohn & Co., Inc.	499
The Meyer & Brown Corp.	2,264
H. Muehlstein & Co., Inc.	336
Chas. T. Wilson & Co., Inc.	149

DEC. 21. By "Memnon," Far East.

H. A. Astlett & Co.	921
Robert Badenhop Corp.	120
General Rubber Co.	1,466
Haldane & Co., Inc.	68
Lavino American & Asiatic Co.	387
Littlejohn & Co., Inc.	1,271
The Meyer & Brown Corp.	3,266
H. Muehlstein & Co., Inc.	835
Poel & Kelly, Inc.	102
Rogers Brown & Crocker Bros., Inc.	1,100

DEC. 22. By "Lepanto," Far East.

Baird Rubber & Trading Co., Inc.	167
N. Diamond & Co., Inc.	104
General Rubber Co.	3,508
Lavino American & Asiatic Co.	253
Poel & Kelly, Inc.	2,350

DEC. 22. By "Nieuw Amsterdam," Far East.

Bierrie & Co., Inc.	52
General Rubber Co.	60

DEC. 22. By "Steel Scientist," Far East.

H. A. Astlett & Co.	862
Robert Badenhop Corp. pkgs.	160
General Rubber Co.	11,547
Haldane & Co., Inc.	809
Lavino American & Asiatic Co.	100
Littlejohn & Co., Inc.	578
The Meyer & Brown Corp.	254
H. Muehlstein & Co., Inc.	690
Poel & Kelly, Inc.	340
Rogers Brown & Crocker Bros., Inc.	1,469
Rogers Brown & Crocker Bros., Inc.	*315
Chas. T. Wilson Co., Inc.	1,104

DEC. 22. By "Unicoi," Far East.

General Rubber Co.	280
Littlejohn & Co., Inc.	200
The Meyer & Brown Corp.	1,680
Chas. T. Wilson Co., Inc.	195

DEC. 24. By "Caronia," Europe.

General Rubber Co.	500

DEC. 24. By "Minnewaska," London.

General Rubber Co.	100
Chas. T. Wilson Co., Inc.	86

DEC. 25. By "Missouri," Europe.

Littlejohn & Co., Inc.	1,576

DEC. 26. By "Dacre Castle," Far East.

H. A. Astlett & Co.	4,515
Robert Badenhop Corp.	750
Baird Rubber & Trading Co., Inc.	400
Bierrie & Co., Inc.	829
General Rubber Co.	6,989
Haldane & Co., Inc.	918
Hood Rubber Co.	250
Lavino American & Asiatic Co.	730
Littlejohn & Co., Inc.	4,540
The Meyer & Brown Corp.	4,145
H. Muehlstein & Co., Inc.	480
Poel & Kelly, Inc.	935
Rogers Brown & Crocker Bros., Inc.	2,429
Chas. T. Wilson Co., Inc.	1,104

DEC. 26. By "Macharda," Far East.

H. A. Astlett & Co.	206
General Rubber Co.	392
Hood Rubber Co.	*74
Littlejohn & Co., Inc.	100
The Meyer & Brown Corp.	700
H. Muehlstein & Co., Inc.	910
Chas. T. Wilson Co., Inc.	365

DEC. 26. By "Pres. Adams," Far East.

H. A. Astlett & Co.	2,400
Robert Badenhop Corp. pkgs.	1,587
Bierrie & Co., Inc.	250

*Arrived at Boston.
†Arrived at Los Angeles.

CASES

General Rubber Co.	6,245
Hood Rubber Co.	*261
Lavino American & Asiatic Co.	350
Littlejohn & Co., Inc.	3,305
The Meyer & Brown Corp.	1,540
The Meyer & Brown Corp.	*400
H. Muehlstein & Co., Inc.	650
Poel & Kelly, Inc.	1,422
Poel & Kelly, Inc.	*250
Rogers Brown & Crocker Bros., Inc.	1,685
Chas. T. Wilson Co., Inc.	418

DEC. 26. By "Toronto," Far East.

H. A. Astlett & Co.	2,301
Robert Badenhop Corp. pkgs.	1,285
Baird Rubber & Trading Co., Inc.	1,500
Paul Bertuch & Co., Inc.	100
Bierrie & Co., Inc.	450
General Rubber Co.	8,587
Haldane & Co., Inc.	700
Lavino American & Asiatic Co.	605
Littlejohn & Co., Inc.	5,162
The Meyer & Brown Corp.	1,953
H. Muehlstein & Co., Inc.	312
Poel & Kelly, Inc.	890
Rogers, Brown & Crocker Bros., Inc.	1,569
Chas. T. Wilson Co., Inc.	1,882

DEC. 27. By "Ambridge," Far East.

Hood Rubber Co.	*240

DEC. 27. By "Silverbeech," Far East.

H. A. Astlett & Co.	3,302
Robert Badenhop Corp. pkgs.	670
Baird Rubber & Trading Co., Inc.	515
Bierrie & Co., Inc.	70
N. Diamond & Co., Inc.	50
General Rubber Co.	8,569
Haldane & Co., Inc.	1,381
Hood Rubber Co.	452
Lavino American & Asiatic Co.	570
Littlejohn & Co., Inc.	4,863
The Meyer & Brown Corp.	3,359
H. Muehlstein & Co., Inc.	1,310
Poel & Kelly, Inc.	1,135
Poel & Kelly, Inc.	*468
Raw Products Co.	410
Rogers Brown & Crocker Bros., Inc.	1,284
Chas. T. Wilson Co., Inc.	900

DEC. 29. By "Beemsterdyk," Far East.

H. Muehlstein & Co., Inc.	140

DEC. 29. By "City of Hankow," Far East.

General Rubber Co.	1,166
Hood Rubber Co.	*127
Lavino American & Asiatic Co.	62
Littlejohn & Co., Inc.	1,186
The Meyer & Brown Corp.	70
The Meyer & Brown Corp.	320
Chas. T. Wilson Co., Inc.	268

DEC. 29. By "Clan Macbeth," Far East.

Robert Badenhop Corp.	50
General Rubber Co.	1,016
Haldane & Co., Inc.	32
The Meyer & Brown Corp.	250
Poel & Kelly, Inc.	61
Chas. T. Wilson Co., Inc.	192

DEC. 30. By "Pres. Lincoln," Far East.

H. A. Astlett & Co., Inc.	†101
Littlejohn & Co., Inc.	†3,684
The Meyer & Brown Corp.	†250
H. Muehlstein & Co., Inc.	†750

JAN. 3. By "Hagen," Far East.

Hood Rubber Co.	*320

JAN. 3. By "Silverelm," Far East.

H. A. Astlett & Co.	†627
General Rubber Co.	†362
Littlejohn & Co., Inc.	†1,869
The Meyer & Brown Corp.	†850
H. Muehlstein & Co., Inc.	†356

JAN. 6. By "Huronian," Europe.

General Rubber Co.	393
Littlejohn & Co., Inc.	126
Poel & Kelly, Inc.	113

JAN. 7. By "Birchbank," Far East.

H. A. Astlett & Co.	3,478
Robert Badenhop Corp. pkgs.	710
Baird Rubber & Trading Co., Inc.	310
Bierrie & Co., Inc.	910
General Rubber Co.	27,149
Haldane & Co., Inc.	450
B. W. Henderson & Co., Inc.	550
Lavino American & Asatic Co.	760
Littlejohn & Co., Inc.	6,662
The Meyer & Brown Corp.	2,516
H. Muehlstein & Co., Inc.	450
Poel & Kelly, Inc.	135
Poel & Kelly, Inc.	*56
Raw Products Co.	816
Rogers Brown & Crocker Bros., Inc.	1,320

CASES

Rogers Brown & Crocker Bros., Inc.	*500
Chas. T. Wilson Co., Inc.	1,750

JAN. 8. By "City of Khios," Far East.

H. A. Astlett & Co.	1,642
Robert Badenhop Corp. pkgs.	1,570
Baird Rubber & Trading Co., Inc.	600
Bierrie & Co., Inc.	1,910
N. Diamond & Co., Inc.	264
General Rubber Co.	14,002
Haldane & Co., Inc.	681
Lavino American & Asiatic Co.	1,696
Littlejohn & Co., Inc.	8,167
The Meyer & Brown Corp.	4,890
The Meyer & Brown Corp.	*700
H. Muehlstein & Co., Inc.	136
Poel & Kelly, Inc.	2,050
Poel & Kelly, Inc.	170
Raw Products Co.	355
Rogers Brown & Crocker Bros., Inc.	1,300
Rogers Brown & Crocker Bros., Inc.	*275
Chas. T. Wilson Co., Inc.	1,783

JAN. 8. By "Maidan," Far East.

Robert Badenhop Corp.	112
Baird Rubber & Trading Co., Inc.	330
General Rubber Co.	3,678
Hood Rubber Co.	*269
The Meyer & Brown Corp.	775
H. Muehlstein & Co., Inc.	720
Rogers Brown & Crocker Bros., Inc.	100
Chas. T. Wilson Co., Inc.	493

JAN. 8. By "Siantar," Far East.

H. A. Astlett & Co.	†322
General Rubber Co.	†330
Littlejohn & Co., Inc.	†100
The Meyer & Brown Corp.	†150

JAN. 9. By "Chinese Prince," Far East.

H. A. Astlett & Co.	2,647
Robert Badenhop Corp. pkgs.	1,736
Baird Rubber & Trading Co., Inc.	492
Baird Rubber & Trading Co., Inc.	*100
Bierrie & Co., Inc.	260
General Rubber Co.	10,389
Haldane & Co., Inc.	516
B. W. Henderson & Co., Inc.	470
Lavino American & Asiatic Co.	600
Littlejohn & Co., Inc.	3,987
H. Muehlstein & Co., Inc.	1,100
The Meyer & Brown Corp.	2,569
Poel & Kelly, Inc.	777
Poel & Kelly, Inc.	*339
Raw Products Co.	414
Rogers Brown & Crocker Bros., Inc.	3,203

JAN. 9. By "Pres. Garfield," Far East.

H. A. Astlett & Co.	1,110
Robert Badenhop Corp.	633
Baird Rubber & Trading Co., Inc.	412
Paul Bertuch & Co., Inc.	100
Bierrie & Co., Inc.	530
General Rubber Co.	4,899
Haldane & Co., Inc.	1,728
Haldane & Co., Inc.	*100
B. W. Henderson & Co., Inc.	150
Hood Rubber Co.	*335
Littlejohn & Co., Inc.	3,687
Lavino American & Asiatic Co.	1,200
The Meyer & Brown Corp.	1,285
H. Muehlstein & Co., Inc.	1,150
H. Muehlstein & Co., Inc.	†500
Poel & Kelly, Inc.	1,070
Poel & Kelly, Inc.	*42
Rogers Brown & Crocker Bros., Inc.	1,730
Rogers Brown & Crocker Bros., Inc.	*550
Chas. T. Wilson Co., Inc.	1,127

JAN. 10. By "Blitar," Far East.

H. A. Astlett & Co.	387
Robert Badenhop Corp.	570
Baird Rubber & Trading Co., Inc.	97
Bierrie & Co., Inc.	250
General Rubber Co.	4,313
Haldane & Co., Inc.	268
Hood Rubber Co.	*271
Lavino American & Asiatic Co.	30
Littlejohn & Co., Inc.	508
The Meyer & Brown Corp.	960
H. Muehlstein & Co., Inc.	410
Poel & Kelly, Inc.	40
Raw Products Co.	81
Chas. T. Wilson Co., Inc.	216

JAN. 10. By "Montgomery City," Far East.

H. A. Astlett & Co.	2,253
Robert Badenhop Corp. pkgs.	465
Baird Rubber & Trading Co., Inc.	100
Bierrie & Co., Inc.	350
General Rubber Co.	12,562
Haldane & Co., Inc.	100
B. W. Henderson & Co., Inc.	300
Hood Rubber Co.	67
Lavino American & Asiatic Co.	425
Littlejohn & Co., Inc.	5,466
The Meyer & Brown Corp.	1,867
H. Muehlstein & Co., Inc.	910
Poel & Kelly, Inc.	152
Poel & Kelly, Inc.	*383
Rogers Brown & Crocker Bros., Inc.	2,964
Chas. T. Wilson Co., Inc.	1,115

JAN. 10. By "Silverray," Far East.

H. A. Astlett & Co.	†446
The Meyer & Brown Corp.	†506

	Cases
JAN. 12. By "Matoppo," Far East.	
H. A. Astlett & Co.	85
General Rubber Co.	1,231
B. W. Henderson & Co., Inc.	104
Hood Rubber Co.	*227
Littlejohn & Co., Inc.	1,642
The Meyer & Brown Corp.	1,750
H. Muehlstein & Co., Inc.	1,395
Poel & Kelly, Inc.	202
Chas. T. Wilson Co., Inc.	1,761
JAN. 13. By "Oscania," Europe.	
General Rubber Co.	200
JAN. 14. By "City of Lincoln," Far East.	
H. A. Astlett & Co.	4,347
Robert Badenhop Corp.....pkgs.	890
Baird Rubber & Trading Co., Inc.	1,412
Bierrie & Co., Inc.	1,390
General Rubber Co.	10,357
Haldane & Co., Inc.	1,550
B. W. Henderson & Co., Inc.	600
Lavino American & Asiatic Co.	1,000
Littlejohn & Co., Inc.	8,665
The Meyer & Brown Corp.	2,735
H. Muehlstein & Co., Inc.	1,850
Raw Products Co.	538
Rogers Brown & Crocker Bros., Inc.	1,665

	Cases
JAN. 14. By "Pres. Madison," Far East.	
Littlejohn & Co., Inc.	†3,050
JAN. 14. By "Pyrrhus," Far East.	
H. A. Astlett & Co.	3,652
Robert Badenhop Corp.....pkgs.	965
Baird Rubber & Trading Co., Inc.	1,025
Bierrie & Co., Inc.	1,046
Haldane & Co., Inc.	614
B. W. Henderson & Co., Inc.	200
Lavino American & Asiatic Co.	625
Littlejohn & Co., Inc.	6,244
The Meyer & Brown Corp.	3,997
H. Muehlsein & Co., Inc.	1,110
Raw Products Co.	250
Rogers Brown & Crocker Bros., Inc.	1,915
Rogers Brown & Crocker Bros., Inc.	*590
JAN. 15. By "Minnekahda," Europe.	
General Rubber Co.	1,195
The Meyer & Brown Corp.	1,095

Africans

	Cases
DEC. 22. By "Nieuw Amsterdam," Europe.	
Littlejohn & Co., Inc.	6
JAN. 8. By "Sarcoxie," Europe.	
Littlejohn & Co., Inc.	101

Balata

DEC. 20. By "Nickerie," Paramaribo.	
Middleon & Co., Ld.....bales	75
DEC. 26. By "Viborg," Paramaribo.	
Middleton & Co., Ltd.....bales	30
JAN. 8. By "Basil," Brazil.	
Paul Bertuch & Co., Inc.	11
JAN. 11. By "Cuthbert," Brazil.	
General Rubber Co.	11

Rubber Latex

DEC. 22. By "Steel Scientist," Far East.	
General Rubber Co.....gals.	64,705
DEC. 26. By "Pres. Adams," Far East.	
Rogers Brown & Crocker Bros., Inc..gals.	*650
JAN. 9. By "Pres. Garfield," Far East.	
Rogers Brown & Crocker Bros., Inc..gals.	*3,400

Paras and Caucho

	Fine Cases	Medium Cases	Coarse Cases	Caucho Cases	Miscel. Cases
DEC. 20. By "Sheridan," South America.					
H. A. Astlett & Co.	65	....	....	219	....
Paul Bertuch & Co., Inc.	160	....	....	....	....
General Rubber Co.	406	2	130	....	1*
Littlejohn & Co., Inc.....pkgs.	1,223	....	....	....	....
The Meyer & Brown Corp.	149	....	....	....	....
DEC. 31. By "Basil," South America.					
H. A. Astlett & Co.	256	6	....	....	....
General Rubber Co.	206	....	25	....	....
Littlejohn & Co., Inc.	441	....	....	....	....
The Meyer & Brown Corp.	132	....	....	....	....
JAN. 11. By "Cuthbert," South America.					
General Rubber Co.	445	2	82	13	2*
Littlejohn & Co., Inc.	98	....	79	....	....
The Meyer & Brown Corp.	145	....	....	....	....

*Mixed.

United States Crude and Waste Rubber Imports for 1928 by Months

	Plantations	Paras	Africans	Centrals	Guayule	Manicobas and Matto Grosso	Total 1928	Total 1927	Balata	Miscellaneous	Waste
January ..... tons	43,668	1,580	433	126	435	1	46,243	45,827	120	1,292	248
February	27,852	756	125	125	587	..	29,445	27,701	58	517	310
March	37,545	2,430	72	92	755	..	40,894	35,054	154	741	830
April	36,108	573	15	20	524	..	37,240	48,632	202	888	18
May	31,564	849	14	5	451	..	32,883	36,285	71	923	142
June	24,752	582	25	9	424	..	25,792	33,142	14	727	165
July	32,536	585	11	62	188	..	33,382	38,416	108	895	33
August	28,675	1,010	105	15	....	..	29,805	32,804	62	775	219
September	45,663	731	262	6	....	..	46,662	32,810	107	961	109
October	41,571	884	37	23	....	..	42,515	31,498	118	785	97
November	33,771	766	118	65	....	..	34,720	40,634	58	737	302
December	45,486	1,304	41	9	....	..	46,840	29,004	71	240	988
Total, twelve months, 1928 ..... tons	429,191	12,050	1,258	557	3,364	1	446,421	.....	1,143	9,481	3,461
Total, twelve months, 1927 ..... tons	405,543	17,576	2,073	1,593	4,989	33	.....	431,807	1,013	12,720	5,420

Compiled from statistics supplied by the Rubber Association of America, Inc.

Netherland East Indies Exports

	Total Jan.-Sept. 1927	Total Jan.-Sept. 1928	Long Tons —1928 Sept.
Java & Madura	41,603	43,614	4,974
Sumatra E. C.	55,597	61,280	6,995
Other N. E. I.*			
Atjeh & Dep.	2,807	2,882	326
Riouw & Dep.	8,230	7,212	763
Djambi	25,247	26,082	2,424
Palembang	15,259	13,940	1,378
Lampongs	1,998	2,291	344
Benkoelen	53	37	7
Sumatra W. C.	1,122	855	102
Tapanoeli	5,360	4,245	589
Banka & Dep.	1,486	556	67
Billiton	126	73	10
W. Bor.	18,897	15,433	2,166
S. & E. Bor.	19,735	19,239	1,666
Menado	168	159	21
Celebes & Dep.	32	31	1
Amboina	7	22	2
Total*	100,527	93,057	9,866
Grand total	197,727	197,951	21,835

*Exports from "Other N. E. I." consist mostly of native rubber of approximately 33⅓ per cent necessary for moisture.
Compiled by Rubber Division, Department of Commerce, Washington, D. C.

Bright Outlook for Rubber Industry

Greater volume of business, continued improvement in the value of rubber stocks, and probable higher rubber prices and better credits are predicted for the rubber industry in 1929 by William O'Neil, president of The General Tire & Rubber Co. of Akron, O.

United States Imports of Crude Rubber and Liquid Latex—By Countries

October, 1928*

	Crude Rubber Pounds	Crude Rubber Value	Liquid Latex Pounds†	Liquid Latex Value
Belgium	435	$78	.....	.....
France	22,646	3,724	.....	.....
Germany	33,820	7,217	18,381	$3,271
Netherlands	639,513	126,816	.....	.....
United Kingdom	12,460,298	2,256,585	340,967	60,522
Panama	7,546	755	.....	.....
Brazil	1,801,028	303,130	.....	.....
Colombia	20,116	2,997	.....	.....
Ecuador	27,078	3,518	.....	.....
Paraguay	11,100	1,814	.....	.....
Peru	99,885	15,205	.....	.....
Uruguay	21,130	4,577	.....	.....
Venezuela	11,023	3,065	.....	.....
British India	87,367	19,995	.....	.....
British Malaya	50,462,167	9,131,038	2,627,191	468,760
Ceylon	8,939,818	1,640,929	112,000	18,937
Java and Madura	11,279,721	2,185,548	5,998	1,095
Other Netherland East Indies	8,445,349	1,690,759	1,186,734	244,408
Australia	24,180	4,363	.....	.....
New Zealand	3,311	1,226	.....	.....
Totals	94,397,531	$17,403,339	4,291,271	$796,993
Long tons	42,142	.....	1,916	.....

*There were no imports of Guayule rubber during October, 1928. Total rubber imports amounted to 44,058 long tons.
†Pounds of dry rubber contained in latex imported; crude rubber content is taken as three pounds per gallon of latex.